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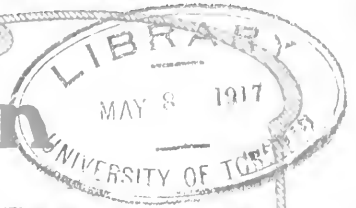
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Notes and News.

The announcement made this week that the Central Mining people had acquired the Neumann interests and would take over the administration of the mines of the latter group as from July 1 was not unexpected. Ever since the death of Sir Sigmund Neumann, some months ago, it was known that some such change as has now occurred was necessary, and all parties are to be congratulated on the deal. It is too early to say what changes in personnel will follow the change of control. Mr. Junius Cook, the Consulting Mechanical Engineer, had decided to retire some time ago; Mr. Wilmot, Electrical Engineer to Neumanns, will join Mr. E. Izod's staff at the Corner House; and generally it is expected that no great changes will be made. It is noteworthy that the technical control of the E.R.P.M. is now also in the hands of the Central Mining people. Including the Randfontein change of control, it will be seen that the Rand groups will this year be thus reduced by three separate units.

The success of last Saturday's "Navy Day" was in no small measure due to the unsolicited support of the mining houses and of the men on the mines. Most of the work of preparing exhibits was done at the mine workshops along the Reef, and from the consulting engineers in the head offices to the humblest apprentice in the workshops, all worked enthusiastically for the cause. To Mr. E. G. Izod, of the Corner House, ably assisted by Mr. Kenneth Austin, much of the success is due; and the heads of the financial houses also surpassed themselves in giving freely and generously. With some of the more notable displays, such as that of Messrs. Hadfield, we hope to deal next week. The net result, it is believed, will be to put the contribution of the Rand to Lady Beatty's Fund second only to that of London among all the great contributing centres of the British Empire—an achievement upon which all concerned are to be congratulated.

The questions put by Mr. H. B. Papenfus to the Minister of Mines in the Assembly this week regarding the report of the State Mining Commission and the Mining Leases Bill did not elicit very satisfactory answers. The report of the Commission, it appears, has resolved itself into a Majority and two Minority Reports—the last-named, doubtless, emanating from the Labour and Nationalist members. Until those reports are published, Mr. Malan can hold out no hope of the East Rand Mining Leases Bill being reconsidered. The danger is, plainly, that for one reason and another the issue of the reports will be delayed and another session allowed to slip by without anything being done to remove the legislative disabilities in the way of the opening up of the Far East Rand.

Valuable evidence was given during the week by Mr. H. M. Taberer before the Underground Contracts Commission. No one is better qualified to speak than Mr. Taberer regarding the aspirations of the native mine worker; and he made it very clear that nothing short of payment by results will satisfy the more intelligent and experienced of these men. The question, of course, is a big one, and the Chamber of Mines people have undertaken not to bring up the matter of the native worker's status until the war is over. No harm can be done, however, by reminding both employers and white employees that there is a third factor to be considered in any discussion of the question, and that is the legitimate rights of the native himself.

Major the Hon. W. L. Frost, General Manager of the S.A.P.C., has written to the papers on the serious shortage of locomotives on the South African Railways. For some time back it has been known that the difficulties of the railways were due less to actual shortages of rolling stock than to a lack of locomotive power. Major Frost's proposal to the public to forego all unnecessary travelling, and to postpone holiday visits to the coast, until the war is over, in order to liberate the engines now employed in moving passenger trains for coal and other essential traffic. His suggestion seems an excellent one, and has, we believe, only to be widely known and understood to command the adherence of every loyal South African.

The reef recently struck by Mr. Dale Lacey in the borchde put down on Spaarwater is generally regarded as identical with the Van Ryn Reef as worked by the Sub Nigel. It will be remembered that the latter company, in a recent quarterly report, definitely declared that the reef being worked in that property was none other than the Van Ryn Reef. The Spaarwater reef possesses all the characteristics of the Van Ryn Reef as seen in the Sub Nigel, and lies at a little over 2,000 feet depth. What its presence means to a large undeveloped area of the Far East may be seen by a glance at the map.

The South African Gold Trust, Ltd., has resumed dividends after a three years' interregnum. According to the preliminary figures issued in anticipation of the directors' report, a profit of £103,567 was earned in respect of 1916, which is the best for any year since 1912, when £112,700 was gained. But in that year £87,000 had to be written off for depreciation, whereas under the new system of taking credit in the accounts for appreciation, no depreciation has in the past year or two had to be allowed for. Moreover, it will be remembered that the debentures were redeemed in 1915, so that there is no charge on their account nowadays. Consequently, after paying the dividend declared of 1s. 6d. per share and transferring £25,000 to reserve, there will be £72,222 to be carried forward against £61,607 brought in. The last distribution was 2s. per share for 1912.

The secretary writes:—"I am directed to inform you that the additional stamps and tube mills, increasing the capacity of the reduction plant to 10,000 tons per month, were placed in commission yesterday."

The report of the Executive Committee of the Rhodesia Chamber of Mines for the month of January, 1917, shows that on the 6th February the Railway Commission Committee received a telegram from H.H.

The Administrator stating that owing to the maritime situation representations had been made to the Government that it would not be right to ask the Commissioner and others concerned to make the journey from England to the Cape at present. The Government had therefore postponed the enquiry for the time being, but would notify the Committee as early as possible as to the date when the enquiry could be opened. The President as Chairman of the Committee proceeded to Capetown on the 17th instant to consult with Messrs. Taylor and Dowling in regard to the preparation of the case. The Committee has been in correspondence with the Salisbury Chamber of Mines with a view to arranging equitable conditions under which miners could enter into contracts with the Salisbury Co-operative Society for the supply of mealies or mealie meal at a fixed price throughout the period of contract. It is understood that the Society is now prepared to enter into these contracts and the attention of member of the Chamber, particularly of those who are small workers, is called to the fact that they can now

approach the Society in regard to the matter. Contracts should be entered into before the 1st May next. The arrangements made by the Government last year in regard to the protection of unworked claims for a period of two years from the outbreak of war by payment of £1 per block for periods of four months, has again been under discussion by the Executive. It was felt that the reasons justifying this arrangement were much stronger now than at the time it was agreed to as the conditions of mining were still more onerous on claimholders. Representations were therefore made to the Secretary for Mines with the object of securing a continuance of the present arrangement, and a reply has now been received stating that in view of the continuation of the war the Secretary for Mines is willing to extend the period of two years during which protection might be allowed to companies or individuals who could show that they were doing a reasonable amount of work in the country. A satisfactory arrangement has been made by the Patent's Committee with the Transvaal Chamber of Mines whereby lists of applications for Letters Patent in the Transvaal and Southern Rhodesia will be exchanged monthly by the two Chambers. The applications to be examined and those to be opposed will be marked, and in regard to the latter the grounds on which opposition will be made will be stated. Other subjects under consideration during the month were (1) the rendering of contractors' monthly returns under the mining law; (2) recommendations of the Economic Conference of the Allies at Paris; (3) Rex v. Morris, etc.

According to diamond market experts, the year 1916 constituted a record for diamonds so far as the United States is concerned, the total imports into that country being no less than \$51,182,262. For the purpose of comparison, we give below the figures of the imports for the last twenty years:—1897, \$7,046,327; 1898, \$12,934,815; 1899, \$19,321,752; 1900, \$13,365,615; 1901, \$24,862,567; 1902, \$25,412,775; 1903, \$24,676,906; 1904, \$26,092,275; 1905, \$37,140,337; 1906, \$13,573,488; 1907, \$31,713,045; 1908, \$12,862,896; 1909, \$10,191,856; 1910, \$40,566,448; 1911, \$40,676,258; 1912, \$40,571,543; 1913, \$46,137,328; 1914, \$19,276,591; 1915, \$25,995,894; 1916, \$51,182,262.

Commenting on these figures, the *Financial News* says:—The production of the South African diamond mines is at present between £5,000,000 and £6,000,000, and we have the assurances of such eminent authorities as the chairman of the De Beers Co. and of the Premier Co. that the supply will remain strictly limited, and that the bogey of over-production, which in the past has been the bugbear of the trade, has been definitely laid to rest. With a production of £6,000,000 and with the United States alone taking last year over £10,000,000 it is apparent to everyone that there is ample scope for a further advance in prices, especially if due regard be paid to the increasing demand of the other markets for diamonds, such as Russia, India, China, Japan, and South America. Since the beginning of this year a rise of about 5 per cent. has already taken place, and it is safe to assume that the next few months will see a further enhancement in price. Nor is there any danger in such rise; the value of diamonds is not alone intrinsic, but is also determined by the wealth and purchasing power of the world, and so long as the production is kept compatible with such purchasing power there are no limits to which the price of diamonds may go. Having regard to this it is matter for surprise in the trade that the investor is not yet alive to the position of the diamond companies. All producing concerns are in a very flourishing condition and have large cash resources, yet the prices of the shares are still well below pre-war levels. (By pre-war levels is not, of course, meant the last official making-up price prior to the war.) The Premier Co. and the De Beers have paid up all arrears on their preference issues, and the Jagersfontein Co. has already re-entered the dividend list, and dividends can shortly be looked for from the two first-named concerns. The outlook for the industry is brighter to-day than for years past, a fact which the investing public may shortly recognise.

TOPICS OF THE WEEK.

CHAMBER OF MINES' ACTIVITIES.

ALTHOUGH the annual report of the Transvaal Chamber of Mines, appearing in another part of this issue, gives little more than an outline of the work done during last year, it bears ample testimony to the many-sided activity of that body. Most of the questions covered by the report will be more fully dealt with in the Presidential Address at the forthcoming annual meeting, but a brief notice of the outstanding features may here be permissible. The war, of course, touches the work of the Chamber at many points, and has directly affected the questions of labour and supplies. In regard to the latter, the Chamber has acted in a thoroughly South African spirit, and has set the whole country a good example in stimulating internal production. Though he did not pretend to speak on behalf of the mining industry in the debate on increasing production, Sir Abe Bailey, in his speech in the Assembly, reflected very accurately the spirit animating the industrial leaders of the Rand. By their actions, however, more than by any pious expressions they may be best judged; and the annual report of the Chamber of Mines shows that they can already point to something tangible done. Thus, from the report we learn that, with a view to encouraging the establishment of local industries, several of the mining groups arranged, during the year, for the formation of a company to provide financial assistance to promising industries. The capital of the company is £100,000, and the directorate consists of Messrs. Alex. Aiken, W. A. Martin and R. Niven. Again, in order to help in relieving the engineering workshops of the United Kingdom, the mines have utilised local engineering resources to an unprecedented extent during the past year. In addition, an experimental plant for the remaking of shoes and dies was erected by the Chamber, constituting the first electric furnace in the country. The experiment has proved successful, and will probably be extended in the near future. In this connection, it is noteworthy that the necessity of economising as much as possible in the consumption of nitro-glycerine has resulted in a great reduction in the percentage of high-grade explosives used on the mines. In 1913 no less than 70 per cent. of the explosives used were high-grade (*i.e.*, containing, say, 75 per cent. nitro-glycerine and over); in January, 1916, this figure had fallen to 23 per cent., and at the end of 1916 to 11 per cent. The report sums up the general position of the industry in regard to supplies as "satisfactory," and adds that "there is every reason to anticipate that sufficient supplies will continue to be available to maintain operations." Next, perhaps, in importance is the excellent progress made during the year with the organisation of the education of young miners and mechanics. It is not too much to say that the year has seen a far bigger step forward in this respect than has yet been generally realised. As modestly described in the report, the training of apprentices on mines has been considerably developed in the course of the year. A technical committee consisting of consulting engineers and consulting mechanical engineers reported on the training of miners and mechanics. That report was adopted by the Executive Committee and subsequently approved in principle by the Government. Thereafter, with regard to the training of miners, a committee consisting of representatives of the Government and the Chamber (the members of the technical committee representing the Chamber) unanimously reported on a detailed scheme. The object of the scheme is to establish along the Reef six schools capable of training some six hundred apprentices, and embraces the Wolluter School, which has been in existence since 1911. That report has been adopted by the Government and the Chamber. A new Board of Control has been appointed to administer the existing and proposed Government Miners' Training Schools. With regard to the training of mechanics, it appears that the report of the technical committee of consulting engineers and consulting mechanical engineers was under the consideration of His Honour the Administrator of the Transvaal at the close of the year. We believe that when the full details of the work done in regard to these two classes become known, it will be seen that the youth of this country

owe a very great deal to the engineers who have framed, and the heads of the Chamber of Mines who have adopted, the statesmanlike schemes of training in question. Brief but informing references will be found in the report to the subjects of labour, miners' phthisis, and dust-sampling. The attitude of the industry towards men who have volunteered, as summarized in the report, calls for emphasis and permanent record as an example at once just and generous to other employers throughout the Empire. Moreover, it provides a very effective answer to the critics who are continually harping on the pre-war cosmopolitan character of the industry. It is shown that over 3,500 employees of the gold mines were on active service with permission during the year, under the following conditions:—Their situations are kept open for them; married men receive half-pay; single men with dependants receive such pay as has been agreed upon between the employer and the man concerned; single men without dependants receive quarter-pay; in each case the above payments are in addition to the military pay such employees may receive; the period of active service counts as service with the company for the purpose of leave privileges; and on discharge each man is granted one month's special leave on full pay, apart from any leave privileges to which he may be entitled under the leave regulations. Since the close of the year the above conditions have been made applicable to temporary men who have been engaged to fill the places of men on active service and who have completed four months' service with the company concerned, with the exception that their situations are not kept open for them in view of the nature of their engagement. With regard to men who have enlisted without the company's permission, these men will be reinstated in their former situations on their discharge, their period of active service counting as service with the company for the purpose of leave privileges. In addition, one month's special leave on full pay will be granted to each man, apart from any leave privileges to which he may be entitled under the leave regulations. We do not know of any other industry in the British Empire that treats its employees more liberally than this. In these days of too easy and not always disinterested criticism, it may be hoped that the fact may be remembered to the credit of the industry.

MR. G. A. DENNY'S CRITICISMS.

THE very interesting paper on "Some Salient Unappreciated issues of Rand Mining Economics" read by Mr. G. A. Denny before the South African Institution of Engineers last Saturday night is bound to provoke a vigorous discussion. Mr. Denny has long been known on these fields as an original thinker, never afraid to give clear and strong expression to his views; and the paper now contributed to the Institution of Engineers exhibits both the merits and defects of his qualities. Mr. Denny's paper is long and detailed. As a former consulting engineer to a Rand group, who has spent a year on the Rand after a long absence, he is, plainly, an authority not lightly to be treated and a critic whose views most always command respect. Particularly do his views on sorting seem eminently sound. For our part, however, it seems wise to reserve judgment until we have the reply of the consulting engineers and those responsible for the working policy of the mines. For Mr. Denny's criticism is aimed clearly less against the rank and file of the industry than against the present-day policy of its technical controllers; and it does seem, at first blush, as if its strictures are far too sweeping to be true, and allow all too little credit for elementary business ability in the men responsible for running the industry to-day. The introductory portion of the paper, which we reproduce in this issue, gives an idea of the aim and method of Mr. Denny's statement of his case. In his own words, it is largely the aim of the paper to show, by simple analysis of methods and operations, and by illustrations based on working experience, that the neglect of so apparently plain a precaution as the full knowledge of the tonnage and value and the cost and production of each separate block of ore in our mines, not on an "averaged," but on an individual basis, makes it impossible "to conduct our business either intelligently as technical men, or successfully as men primarily engaged on

accruing to the most economical result attainable. Another important point in the preparation of the paper is to show that the principle of working cost per ton so lacking a feature in the operations creates conditions which put a premium on inefficiency. In justice to Mr. Denny, it must be admitted that he makes a very good showing in support of both these points, though in doing so he may be accused of taking extreme cases as examples, and of preparing what on the whole amounts to a piece of very special pleading. In places Mr. Denny lays himself open to the retort that he must not judge the whole Rand from his experience at one mine. Few of his arguments are altogether new or unfamiliar. They merely take us back to Mr. Marriott's long forgotten theory of "square fathomage" and to the decade-old discussions on the crushing of waste rock. We imagine, moreover, that several of the assertions with which he prefixes his paper will not be allowed to go unchallenged. For instance, we want something more than Mr. Denny's unsupported *ipse dixit* for the following during admixture of argument and assertion:

"Reviewing the field of subjects within my experience and capabilities, I was led to the selection of that covered by the title of this paper for the reason that it seemed to me, from the special investigations upon which I have been engaged since my return to this country, that in the glamour of unprecedented and almost unchecked capital expenditure, immense equipments, colossal tonnages, and record gold production, there is a striking tendency to forget that the economic result is in the last resort the goal to which we must aspire, and the standard by which our work must finally be judged. Apart from the apparent lack of a serious and due consideration of what capital commitment on mines really implies, I have been particularly impressed by the very vague knowledge available to the mine manager respecting the economic fundamentals of his business, namely, the true sources of his working profit, or, in other terms, which portions of his reserves of ore are profitable and which unprofitable. Without such knowledge as is afforded by de-

tailed costing, not only might the current operations of a mine be prejudicial to its standing, but the conclusions based on current operations might lead to the adoption of a future policy so radically contrary to its interests as to lead an otherwise sound undertaking to disaster. This surprising state of affairs is traceable directly perhaps to the system of cost keeping and cost distribution formulated for the use of the mines, and indirectly to other causes, e.g. (1) The unlimited demand for our product. (2) The absence of competition in marketing it. (3) The concentration of effort on but one article of production. (4) The virtual non-recognition of capital charges in working account."

From this introduction we may jump to the concluding passage of Mr. Denny's paper, wherein he condemns "the working cost per ton" basis of comparison in a passage of almost lyrical fervour. At any rate, there is no doubt about his meaning when he sums up: "In my conception, therefore, working cost per ton strikes at the root of efficiency, and presents a very misleading view of the financial condition of our mines as business enterprises. To abandon the working cost per ton practice, and substitute as the leading principle maximum profit, is only on the face of it a question of book-keeping. But in reality it means the dethronement of a tradition which had its inception at the birth of mining here, and is so ingrained into the fibre of the working systems that nothing but a revolution in ideas can displace it. I would be glad to feel that I have contributed even in the smallest measure to the beginning of what I regard as so indispensable a change." After all, open criticism is good for the soul; and we have no doubt that for all their tendency to over-emphasis, Mr. Denny's views will do some good. His counsels of perfection may not all be applicable; but assuredly they will serve to remind our engineers and financial managers of the unchanging economic verities which in the never-ending industrial round and struggle, are sometimes in danger of being forgotten.

Zaaiplaats Tin.

The results for the month of February, 1917, were as follows:—Days run, 25 days; ore milled, 2,198 short tons; residues re-treated, 900 short tons; concentrates won, 27 long tons; average value of concentrates, 71 per cent. M.T.; estimated loss for the month, excluding Government taxes on profits, £318 6s. 10d.; add adjustments in respect of estimated values of previous shipments, £143 5s. 11d.; loss declared for the month, £161 12s. 9d.; capital expenditure, nil. Note:—Revenue for the month has been calculated on the basis of tin at £188 per ton.

The Zaaiplaats directors' report for the quarter ended 31st January, 1917, shows that the mill ran on 78 days during the quarter, crushing 5,567 short tons, the duty per stamp being 8.8 tons per 24 hours. In addition 1,730 short tons of sands residues were re-treated. The output for the quarter amounted to 71 long tons of concentrates, assaying approximately 71.4 per cent. metallic tin. In addition 1,072 lbs. metallic tin was produced, and sold, assaying 99.2 per cent. The results of working show an estimated loss of £1,077 16s. 1d., excluding Government taxes and directors' fees, made up as follows:—Estimated loss for the three months' operations, £1,605 11s. 2d.; deduct adjustments of estimated values of previous shipments, £527 18s. 1d.; total, £1,077 16s. 1d. The average price per ton of metallic tin on which the above figures have been calculated is £182 11s. 1d. No. 13 section: Development on the indications referred to in the report for the previous quarter was successful in locating the extension of the main ore body. During the latter half of the quarter the ore body attained its usual size and strong character, but the grade has not yet exceeded the normal milling average. General: Underground operations have been restricted mainly to No. 13 ore body owing to the shortage of native labour. Labour is, however, now becoming more plentiful, and it is hoped to re-start operations in the new lease by the end of February. Alluvial work will also be taken in hand as soon as the labour position improves sufficiently. During the quarter 6,165 tons of ore were mined, and disposed of as follows:—Appor- tioned to T.C.L., 156 short tons; waste sorted, 1,013 short

tons; sent to mill, 5,567 short tons; total, 6,736 short tons; less taken from reserve dumps, 571 short tons; total, 6,165 short tons. The directors regret to record the death of Mr. D. M. Munro, which took place during the quarter. Mr. Munro had occupied a seat on the board from the inception of the company, and had always rendered very valuable assistance in the direction of its affairs. Messrs. John Munro and John Yendall have been appointed to fill two vacant seats on the board.

Transvaal Gold Mining Estates.

The following are the particulars of this company's output for the month of February:—Central Mines: Tons crushed, 11,900, yielding 5,776.2 fine ozs. Elandsdrift Mine: Tons crushed 1,320, yielding 1,002.9 fine ozs. Vaalhoek Mine: Tons crushed 1,780, yielding 597.5 fine ozs.: Estimated value of month's output, £30,630; estimated profit for the month, £8,338.

East Rietfontein Syndicate.

The report of the directors of the East Rietfontein Syndicate for the year ended 31st December, 1916, submitted at the thirteenth ordinary general meeting of shareholders, held in the Board Room, Consolidated Gold Fields Buildings, Simmonds Street, Johannesburg, on Friday, the 23rd February, 1917, shows that the capital of the syndicate, which is unaltered, remains at £25,000, in 25,000 shares of £1 each, all of which have been fully issued. The area of the property remains the same as at the date of the last report, and comprises 1,758 morgen 352 square rods on the farm "Witkopje" No. 7, in the mining district of Boksburg. Practically the whole available extent of the property is under lease for agricultural and other purposes. A profit of £537 15s. 8d. was made during the year under review, which is a decrease of £1,036 16s. 11d. as compared with the profit made for the year ended 31st December, 1915. Owing to the long period of drought, the sales of water from the Pan amounted to only £45 17s. 10d., as compared with £1,188 0s. 11d. for the previous year.

RAND MINING ECONOMICS: SOME SALIENT UNAPPRECIATED ISSUES.

[By G. A. DENNY.]*

I HAVE been invited by your Council to contribute a paper on some subject of such general interest as might provoke a wide and informing discussion from the members. Reviewing the field of subjects within my experience and capabilities, I was led to the selection of that covered by the title of this paper for the reason that it seemed to me, from the special investigations upon which I have been engaged since my return to this country, that in the glamour of unprecedented and almost unchecked capital expenditure, immense equipments, colossal tonnages, and record gold production, there is a striking tendency to forget that the economic result is in the last resort the goal to which we must aspire, and the standard by which our work must finally be judged. Apart from the apparent lack of a serious and due consideration of what capital commitment on mines really implies, I have been particularly impressed by the very vague knowledge available to the mine manager respecting the economic fundamentals of his business, namely, the true sources of his working profit, or in other terms, which portions of his reserves of ore are profitable and which unprofitable. Without such knowledge as is afforded by detailed costing, not only might the current operations of a mine be prejudicial to its standing, but the conclusions based on current operations, might lead to the adoption of a future policy so radically contrary to its interests as to lead an otherwise sound undertaking to disaster. This surprising state of affairs is traceable directly perhaps to the system of cost keeping and cost distribution formulated for the use of the mines, and indirectly to other causes, *e.g.* :—

- (1) The unlimited demand for our product.
- (2) The absence of competition in marketing it.
- (3) The concentration of effort on but one article of production.
- (4) The virtual non-recognition of capital charges in working account.

If the principles comprised in 1, 2, 3 and 4 were reversed, it is clear that a manager would need to be informed to the minutest detail as to the cost in each department and in every section of the various departments, otherwise he could not compete against other producers whose organisations in economic system were superior. It will doubtless strike many as strange that so ordinary a matter as detailed cost distribution should lead to such serious results as I have mentioned. It is largely the aim of this paper to show, by simple analysis of our methods and operations, and by illustrations based on working experience, that the neglect of so apparently plain a precaution as the full knowledge of the tonnage and value and the cost and production of each separate block of ore in our mines, not on an "averaged," but on an individual basis, makes it impossible to conduct our business either intelligently as technical men, or successfully as men primarily engaged in securing the best commercial result attainable. Another important object in the preparation of this paper is to show that the principle of making working cost per ton so leading a feature in our operations, creates conditions which put a premium on inefficiency. The limits of this paper do not permit of an analysis of the reason or of the meaning of the reduction in working cost per ton registered between the years 1902 and 1916. I must confess that since my return to this country I have been unable to confirm, what would appear to be a necessary accompaniment of a great cost reduction, namely, an increased white labour efficiency. My impression is totally to the contrary. I was at a loss to discover how the cost of production could have been so greatly reduced when work seemed less efficient, important new avenues for expenditure had been created, and the

price of supplies had increased. Comparing the figures of 1902 with those of 1915, I found that the cost had been reduced by 8s. 4d. per ton. The yield in the same period had, however, fallen by 15s. 9d. per ton. In this paper I attempt to show that a very similar result may be attained if stoping widths are unduly increased, resulting in the milling of ore of lower than profitable grade or if waste rock be milled in order to increase the tonnage divisor into the total expenditure. Which leads me to wonder how much of the reduction in the cost per ton made in recent years is really a genuine saving of expenditure, owing to the effect of larger increased all round efficiency, and to what extent it is the result of increasing the divisor by ore of unprofitable grade, cheaply obtained, but containing less value than the cost required to handle it? And whether the reduction in cost per ton, capital and all charges considered, has been achieved without a serious loss in profit? A complete investigation of these fundamentals of our mining economics is worthy not only of the attention of our members, but in these days of suggested State mining, also of the Government and the public at large. With your permission, I will digress for a little from my immediate subject to touch upon issues of more general economic interest. The thought must have occurred to many engineers that there is a quite unnecessary duplication of reduction plant with all its concomitants in this district. Can such unnecessary capital outlay be avoided in the future, and how? It is generally believed, and with good reason, that selected areas of the Far East Rand offer such excellent mining opportunities that they will gradually be opened up either by State or private enterprise, or a combination of the two. It may be assumed that eventually at least 25 new companies will be established in that district. To separately equip each mine with reduction plant will involve an expenditure of from £15,000,000 to £20,000,000, and will cost each company for redemption of principal and interest, say, £70,000 per annum, which must be deducted from the profits. To prevent this duplication of plant and consequent unnecessary waste of capital, it would appear to be advisable to concentrate the whole of the milling requirements of the virgin district in one plant, which should be financed independently of the mines, whether by private or Government funds is immaterial. From its very inception such a metallurgical establishment would command the advice and assistance of the best men procurable. Before deciding on the type of plant to be adopted, the milling principles and practice of the mining districts of the world would be studied, not only with respect to their efficiency, but also with regard to their capital cost, so that a plant embodying the most modern practice with economy of expenditure for instalment and operation would be selected. The plant would be called upon to mill from 500,000,000 to 700,000,000 tons of ore during its period of activity, but its growth would be gradual, corresponding to the demands of the district. If not State-owned such an establishment would need to be at least chartered by the State and regulations respecting tariff would need to be laid down. The capital cost on such an establishment would show an immense saving over the duplications necessitated by the equipping of 25 separate mines, and the central company would have so extended a period for capital redemption that the tariff charge should be less than the individual companies could hope to attain in their own practice. It would be a highly specialised business, administered by experts in that business. The mining companies would remain purely as such, specialising in the skilful and efficient working of their mines. There would be no necessity in such circumstances to mill more tons. The mine would deliver its daily quota to the central sampling plant, but it would be ascertained with all security that every ton sent, not only represented adequate profit.

* From a paper read before the S.A.I. of E.

but to a more complete degree. There is no profit in the culture which is the only revenue out of such a scheme, not even the small profit that would be a valuable factor in the maintenance of the East Rand as an undisturbed cheap labour source for any other public utility. I commend the committee for the worthy of your full consideration. It is a happy thought that as your successful year so the present year, on these fields become more stereotyped. It therefore seems helpless against the inertia of a settled practice, an opinion that for the speed conditions present in the existing practice represents the ultimate possible limit of efficiency. This is the result of many practical conditions all tending towards the same end. First amongst these I would place the labour situation. We replace the work of our 200,000 unskilled labourers annually by another 200,000, partly experienced, partly primitive savages. In this we are probably unique. This great body of unskilled labourers is taught by example, and all in one school. The methods required are those which were established when mining commenced in this district, these remaining unchanged despite the immensely different problems presented by mining at and near the outcrop, and at depths of over a mile on the plane of the reef below the outcrop. To wield this great mass of unenlightened labourers, and direct their conservative tendencies into new channels is almost out of the question, therefore to follow in the track of settled practice in many important departments of labour is almost compulsory. A highly organised central labour bureau is not only responsible for the collection of virtually all the contract coloured labour employed, but also decides what numbers every mine may have, to some extent how they shall be used, and how paid. It does its work with strict impartiality and great efficiency. But the system imposed on the mines by virtue of the necessity for such an institution is obviously detrimental to individuality, because in its labour organisation every mine is patterned on its neighbour. In this it but follows the line of least resistance. Next in the order of things I would place the characteristics of the mines and the composition of the ores. Every mine from one end of the Rand to the other, is essentially of the same class. Variations occur in the dip of the reef, in the width of the reef, in the hardness of the walls, and in the character of the faulting, but the broad outlines are identical in all mines. The chance for individuality in such circumstances is small. Where there are no particular problems, there is no direct incentive to effort, and consequently no improvement in practice. It settles into the dead level of conventionality. The composition of the ores on the Rand is for all practical purposes invariable. There are no metallurgical problems of any kind concerned in its treatment. It is the apotheosis of simplicity. For years past no demand has been made on metallurgical skill for the solution of thorny points, consequently there has been little modification of practice. A plant of one pattern was adopted, now approaching a quarter of a century ago, and with few exceptions has been established on all mines in this district. Of all the great precious

metal mining fields in the world, I believe this is the only one that in two generations of experience has found it unnecessary to alter the fundamental type of its reduction plant. In my opinion the cause is not far too seek. Firstly, it is due to the absence of any difficulty in the treatment of the ore, and the lack of incentive thereby created. Secondly, to the centralisation of control, which implies standardisation in all operations. Thirdly, and not least, it is the result of the want of a proper charge for capital cost in the operations. Apart from anything else, the recognition of capital charges in working cost would, in my opinion, have been ample incentive for change. Who can doubt that the capitalist would have brought constant pressure to bear upon the metallurgist and the mechanical engineer, for a reduction in capital outlay, if they had been faced by a difference of a calculable amount per ton, could the reduction plant have been more cheaply installed? And would not the principle that the plant should last only for a restricted period, say, ten years, create the impulse to bring practice in the new plant right up-to-date in the light of the world's experience? In short, the stimulus for improvement and change which is so evidently absent to-day, would be abundantly furnished. Neither in the past nor now has there been any lack of men competent to create, and eager to plan methods or machinery directed to improvement. But the comfortable feeling on the part of the capitalist that all was well with extraction and the worst was known respecting expenditure—which there was no call to recognise—and that it were wise to let well alone, have been dominant factors in maintaining metallurgical methods practically unchanged for so many years. Remove this atmosphere of self-satisfaction by impartial inquiry into what the rest of the world is doing and give a lead to the Rand engineers to show their capabilities for lowering capital cost and achieving similar or better economic results than any heretofore attained, and there is no question but that they will justify the highest expectation. In order to clear the ground for the principal subject matter for this paper, I thought it would be convenient to state my ideas upon the compilation of what after all is the foundation of our business, namely, ore reserves, and at the same time to analyse the principles of the methods we commonly employ. This has led me into wider paths than I at first thought to tread, but I trust that because of the practical importance of the subject this will be condoned. I have also been at pains, even at the risk of repetition, to make some of what I consider the most important economic points very prominent, even perhaps to the extent of weariness. The necessity for emphasis from many a varying standpoint must be the excuse. Although, as far as I am aware, no mine on these fields is organised on the lines I suggest as vital in this paper, I am quite sure that the necessity must have been apparent to many of my colleagues. Inertia, or obstruction, or sheer indifference on the part of others concerned, may have been leading causes why things have been permitted to drift.

(To be continued.)

There was no appearance by the plaintiff in a mining action last week to Mr. Justice Ward in the Rand Division of the Supreme Court. Claim for £3,000 had been made by James Lockhart, of Randfontein, against the Randfontein Estates G.M. Co. as remuneration for services rendered. Plaintiff had undertaken with one J. P. Campbell to trace the Botha Reef on the Stubbs section of the company's property, defendants to provide the labour, tools and explosives. The undertaking was to open up the reef for a lateral distance of 50 feet and to sink on the reef for 6 feet. The matter of reward was to be left entirely in the hands of the defendants. Plaintiff in his declaration averred that he did point out and trace and open up the Botha Reef to the distances and extent specified. For the defence it was denied that plaintiff had carried out what he had undertaken. In support of this defence Dudley Hewitt Thacker, general manager of the Randfontein Central G.M. Co., was called to state that he had examined the trenches made by plaintiff on the defendant company's property. The trenches were about half a mile from the Stubbs section. No reef of any kind had been exposed by the trenches. There was just a surface wash, which had been tested and found to be absolutely valueless. On the application of Mr. Van Hoytema, for the company, judgment was given for the defendants with costs.

City and Suburban.

The following are the results of this company's operations for February: Tons milled, 23,700; gold recovered, 10,649 fine ozs.; profit, £17,266. The reduced scale of operations is chiefly due to the short month and the continued shortage of native labour.

MINING EXAMINATIONS.

Study for Certificates as Mine Captains, Mine Managers, Surveyors, Mechanical and Electrical Engineers, and Engine Drivers. Private Tuition and Correspondence Lessons, where personal tuition is impracticable. Practical Mathematics and Electrotechnics. E. J. MOYNIHAN, Consulting Engineer, Cuthbert's Buildings, corner of Eloff and Pritchard Streets, Johannesburg, P.O. Box 2061.

TRANSVAAL CHAMBER OF MINES: ANNUAL REPORT.

An Official Review of the Outstanding Industrial Questions of the Year.

THE report of the Executive Committee of the Transvaal Chamber of Mines for 1916 has the following, *inter alia* :—

On December 31st there were 68 ordinary members of the Chamber, viz.: Class I., 1; Class II., 19; Class III., 8; Class IV., 39; Special, 1. There were 1 Associate and 6 Honorary Members. During the year 1 Ordinary Member joined the Chamber, and 1 withdrew from membership.

NATIVE LABOUR.

The returns furnished by the Witwatersrand Native Labour Association, Limited, show that the following numbers of native labourers were employed by members of the Association, on the last day of December in each of the years 1915 and 1916. These figures, which are merely given for the purpose of comparison, include natives in the service of mine contractors, but exclude natives in the employ of members of the Association in the district of Barberton, as well as those at the Breyten, Cornelia, and Coalbrook Collieries.

	1915.	1916.
On Gold Mines	209,438	191,547
On Coal Mines	9,309	11,187
On Diamond Mines	132	5,194
On Tin Mines	807	765
	219,686	208,593

As regards the Transvaal Province as a whole, the total number of native labourers employed in proclaimed labour districts was as follows on December 31st, 1916 :†

Employed on Mines and on the various classes of works, <i>i.e.</i> , Chemical, Metallurgical, Brick-making, and other works as defined in Part I. of the Coloured Labourers' Health Regulations	218,991
Ordinance of 1906	55,079
Other employ	274,070

† From returns furnished by the Government Native Labour Bureau.

Labour Native Contingent.—In connection with the contingent of native labourers recruited by the Government for service in Europe, native hospital orderlies to the number of seventy were trained by the Witwatersrand Native Labour Association, Limited, at its hospital, for service with the contingent.

GENERAL HEALTH CONDITIONS ON MINES.

Miners' Phthisis.—The first interim report of the Miners' Phthisis Medical Bureau shows that the number of mine employees now found to be suffering from miners' phthisis is much smaller than at the time of the medical examinations carried out by the Miners' Phthisis Medical Commission in 1912. The report of the Bureau shows that out of 3,447 European underground employees examined since September, 1916, 35 were suffering from silicosis in the secondary stage, or from silicosis plus tuberculosis, and 190 from silicosis in the primary stage—a total of 225, or 6·52 per cent. of those examined. The Medical Commission of 1912, in its examination of 3,136 white underground employees, found that 26·1 per cent. exhibited undoubted physical signs of silicosis. The results of the medical examination of the native employees were also encouraging. *Miners' Phthisis Prevention Committee.*—The Miners' Phthisis Prevention Committee issued a general report in the course of the year, which was printed and widely distributed, dealing with the investigations of the Committee from its inception up to December, 1915. Its principal recommendations had already been put into practice. Since the issue of that report the Committee has been continuing its investigations into the general health conditions underground, more particularly underground ventilation, and the use of mine water for spraying purposes. *Standing Committee on Dust Sampling.*—During the year the Chamber's Dust Sampling Department completed six dust sampling surveys of the mines, the average dust contents of these surveys in milligrams of dust per cubic metre of air being as follows:—5th survey, 3·8; 6th survey, 3·9; 7th survey, 4·4; 8th survey, 5·1; 9th survey, 3·6; 10th survey, 2·9. In the opinion of your Executive Committee, these results, as compared with the results of the previous surveys, support the conclusion that there has been a substantial all-round improvement in the conditions underground. The number of dry drilling cases coming under the personal notice of the samplers has also shown a marked decrease. The total number of samples analysed in the Chamber's laboratory during the year was 12,197. At the end of 1915 it was decided that every mine should employ a special official to attend to dust sampling and allied matters. Subsequently it was found desirable to add to the special knowledge of these officials by means of a series of lectures carried out by Professor J. S. Cellier, of the South African School of Mines and Technology, and by the Chamber's Chief Dust Sampler, Mr. J. Boyd. The system of attaching an official dust sampler to each mine has proved a success, and has materially helped towards the improvement in the underground dust conditions indicated by the figures already mentioned. During the year an educational pamphlet on "Dust and Miners' Phthisis," drawn up by the Standing Committee on Dust Sampling,

was printed by the Chamber and circulated amongst the underground workers on the mines. *Medical Research.*—During the year Dr. F. S. Lister, Research Bacteriologist to the South African Institute for Medical Research, continued his researches into the occurrence and prevention of pneumonia amongst native mine labourers, with valuable results. The investigations are still in progress, and there is every probability that Dr. Lister's discoveries will not only conduce to a substantial further improvement in the health of the native mine workers, but will further direct world wide attention to the work of the Institute. *Transvaal Miners' Phthisis Sanatorium.*—The work of the Transvaal Miners' Phthisis Sanatorium throughout the year does not call for any special comment. The Institution maintains its usefulness as a factor in alleviating the condition of sufferers from miners' phthisis. The Government has not yet intimated its decision in regard to the provision of a separate Sanatorium for men suffering from silicosis only, but the decision is expected at an early date. *Silicotic Employment Office.*—An employment office, under the aegis of the Association of Mine Managers, was opened in October, to which silicotic sufferers desiring employment may apply for work, and various classes of work on the surface of mines are being specially reserved by the gold mining companies for their employment. *Training of Male Nurses.*—The first examination in Anatomy and Physiology for the training of European superintendents and attendants in native mine hospitals was held in October. The examination was conducted by the Transvaal Medical Council, under regulations promulgated in terms of the Medical, Dental and Pharmacy Ordinance (No. 29 of 1901, Transvaal), and your Executive Committee has pleasure in reporting that 54 out of 60 candidates employed by the gold mining industry were successful. *Health of Natives.*—The mortality amongst native labourers employed by members of the Witwatersrand Native Labour Association, Limited, during 1916 is the lowest on record, the death rate per 1,000 per annum from disease being 13·90, as compared with 16·38 in 1915, and with 14·85 in 1914, which was the previous record. The accident death rate, which was 3·49 per 1,000 in 1915, was 3·27 per 1,000 in 1916, and is also the lowest on record. The combined death rate from disease and accidents in 1916 was 17·17 per 1,000, as compared with 18·35 in 1914, the previous best.

MINING EDUCATION.

S.A. School of Mines and Technology: Chamber's Scholarship and Gold Medal.—In view of the number of students on active service, the Council and Senate of the South African School of Mines and Technology advised the Chamber that no award of its Scholarship and Gold Medal for the year 1916 should be made.

MINING SUPPLIES.

Certificates.—During the year the system under which certificates for the importation of essential mining supplies are issued by the Chamber has been continued and extended. The weight attached to these certificates by the Munitions Department has rendered their issue a matter of great importance, engaging the close attention of the Executive Committee, through the Central Buying Committee and the Sub-Committee of Consulting Mechanical Engineers. Every care is taken that certificates are only issued in cases where the delivery of the material in question is considered essential to the continuity of mining operations. *Local Production.*—In order to help in relieving the engineering workshops of the United Kingdom, the mines have utilised local engineering resources to an unprecedented extent during the past year. In addition, an experimental plant for the remaking of shoes and dies was erected by the Chamber, constituting the first electric furnace in the country. The experiment has proved successful, and will probably be extended in the near future. *Conservation of Glycerine.*—The necessity of economising as much as possible in the consumption of nitro-glycerine has resulted in a great reduction in the percentage of high-grade explosives used on the mines. In 1913 no less than 70 per cent. of the explosives used were high-grade (*i.e.*, containing, say, 75 per cent. nitro-glycerine and over); in January, 1916, this figure had fallen to 23 per cent., and at the end of 1916 to 11 per cent. *General.*—The general position of the industry in regard to supplies is satisfactory, and there is every reason to anticipate that sufficient supplies will continue to be available to maintain operations.

INDUSTRIAL CONDITIONS OF WHITE EMPLOYEES.

Certificated Winding Engine Drivers. In the course of the year the Chamber completed Agreements with the Associations representing Certificated Winding Engine Drivers, one governing conditions of work and holiday leave, and the other establishing a Board of Conciliation for the settlement of disputes. The Agreements in each case are for a period of five years from October 1st, 1916. *Stationary and Locomotive Engine Drivers and Firemen.* Subsequent to the completion of the Agreements with the Associations representing Certificated Winding Engine Drivers, the South African Engine Drivers' and Firemen's Association submitted requests for an increase in the wages of this class of employee; that time worked on any one day in excess of eight hours be paid at 1½ times the ordinary rate of pay; that time worked on Sunday be paid at the overtime rate; and that these men be entitled to fourteen days' holiday leave per annum on full pay. The negotiations were not completed at the close of the year. *Apprentices on Mines.*—The training of apprentices on mines

has been considerably developed in the course of the year under review. A technical committee consisting of Consulting Engineers and Consulting Miners of Engineers reported on the training of miners and mechanics. That report was adopted by the Executive Committee and was recently approved in principle by the Government. Thereafter, in regard to the training of miners, a committee consisting of representatives of the Government and the Chamber (the members of the technical committee representing the Chamber) unanimously reported on a detailed scheme. The object of the scheme is to establish at the Rect six schools capable of training some six hundred apprentices, and embraces the Wollmer School, which has been in existence since 1911. That report has been adopted by the Government and the Chamber. By Government Notice No. 1507, dated November 29th, 1916, published in the *Union Gazette*, dated December 1st, 1916, a new Board of Control was appointed to administer the existing and proposed Government Miners' Training Schools. With regard to the training of mechanics, the report of the technical committee of Consulting Engineers and Consulting Mechanical Engineers was under the consideration of His Honour the Administrator of the Transvaal at the close of the year.

MINERS' PHTHISIS ACT, 1916.

Act No. 11 of 1916. This Act came into force on August 1st, 1916. The more important amendments of the previous law are: The increase in compensation of men suffering from Miners' Phtisis; the compensation of men suffering from tuberculosis only; the provision that after August 1st, 1918, sufferers from miners' phtisis in whatever stage shall only be entitled to the same amount of compensation; the provisions for the elimination of tuberculosis from the mines; the periodical medical examination of all employees; and the establishment of a Central Medical Bureau for the purpose; and the power to assist industrial undertakings financially for the purpose of obtaining employment for beneficiaries. The Act embodies the recommendations of the Select Committee on the working of the Miners' Phtisis Acts, and many of those advocated by the Chamber in its evidence.

TRADING WITH THE ENEMY ACT, 1916.

Act No. 39 of 1916.—This Act came into force on June 22nd, 1916, and is generally on the lines of the English Acts. The Chamber made representations to the Government with a view to indemnifying companies registered in South Africa for certain past and future acts under the English Acts. The Chamber's suggested amendments were embodied in the Act.

SPECIAL WAR TAX (GOLD MINES) ACT, 1916.

Act No. 34 of 1916. This Act was assented to on June 10th, 1916, and reenacted the Special War Levy of £500,000 of the previous year, the machinery for levying the tax remaining unaltered.

PATENTS, DESIGNS, TRADE MARKS, AND COPYRIGHT ACT, 1916.

Act No. 9 of 1916. This Act consolidates the laws relating to the granting of Letters Patent for inventions, and for the registration of Patents, Designs, Trade Marks, and Copyright, and is divided into five chapters. The first deals with Patents, the second with Designs, the third with Trade Marks, the fourth with Copyright, and the fifth with General and Supplementary Provisions. Provision was made for the different chapters to come into operation on different dates. The chapter on Patents came into operation on January 1st, 1917. It is based on a Draft Bill attached to the Report of a Commission of Judges appointed in 1911, which issued its Report in January, 1913. The Chamber gave evidence before that Commission, and most of its recommendations were embodied in the Draft Bill. In 1914, the Chamber made representations to the Government on that Bill recommending various amendments, more particularly dealing with machinery, and its recommendations, in the main, were adopted in the Bill as introduced into Parliament. In 1916, the Chamber submitted certain further amendments of minor importance, which are embodied in the Act. The only matter of principle recommended by the Chamber which was not adopted by the Government was the suggestion of an official examination of application for Letters Patent.

LOCAL AUTHORITIES RATING AMENDMENT ORDINANCE, 1916.

This Ordinance was assented to on March 10th, 1916. It enables local authorities, if they so wish, to raise the revenue they may require by a single tax—namely, a rate upon the site value of land only, up to a rate of 7d. in the £. The single tax may be supplemented by a further rate upon improvements, but the rate upon improvements may, by resolution of the local authority, apply only in respect of rateable property held under mining title, and in that event imposed in addition to the rate on the site value of the land. The definition of "rateable property" is amended so as to include the present and reversionary rights of owners to the surface of proclaimed land. The Chamber made representations to the Government, protesting against any rate upon improvements not being equally distributed among all ratepayers, and also with regard to the provision including in the definition of "rateable property" the freehold owner's present and reversionary rights to the surface of proclaimed land.

(To be continued.)



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FIVE PER CENT. FIRST MORTGAGE DEBENTURES.

THE INTEREST DUE on the 1st April, 1917, will be paid
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In London: At the Office of the Company, No. 1, London Wall
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In Johannesburg: At the Transfer Office of the Company, 4th
Floor, The Corner House.

Coupons must be left **four clear days** for examination, and may
be presented at the Johannesburg Transfer Office any day (Satur-
days excepted) between the hours of 10 and 1, and 2 and 3.

Forms of Application for listing the Coupons and for the de-
claration required to comply with the Trading with the Enemy Act,
1916, may be obtained at the Transfer Office of the Company.

By Order,

Transvaal Consolidated Land and Exploration Co., Ltd., Secretaries.

W. E. S. LEWIS, Secretary.

Head Office: The Corner House,
Johannesburg, 16th March, 1917

Correspondence and Discussion.

Comments on Questions Arising in Technical Practice or Suggested by Articles in the Journal—Views, Suggestions and Experiences of Readers.

O.F.S. Coal and Its By-Products.

To the Editor, *South African Mining Journal*.

Sir,—Seeing that the demand for coal lately has increased to a very considerable extent, and is likely to be in greater demand, especially when it can be found and produced at a much shorter distance from such places as Bloemfontein, Kimberley, Port Elizabeth, East London, and Capetown, than from places they are now obtaining their supplies from, I now wish to place before the public the following facts, which will, I feel, be the means of securing the above-mentioned advantage. It must not be overlooked that Kroonstad, with its geographical position, the junction of several railways, the centre of our Union, will become very important in the near future, especially by the development of the coal beds, and the development of its by-products. In 1896 I put down three boreholes in the vicinity of Kroonstad, from 1,000 to 1,400 feet, with the result that seven seams of coal were struck; the diagram of strata is still in my possession. No. 1 borehole shows the best results, the 9 ft. seam was equal in quality to the Vereeniging, the 4 ft. 6 in. seam was at first declared by a certain Johannesburg assayer to be anthracite, and afterwards informed it was not. I never had the analysis, although making frequent demands. It was tested here in Kroonstad in a primitive way, by being lighted with a match, when it burnt without producing smoke and left a red coal of fire. This, I believe, is the class of coal to produce the by-products of motor spirit, high explosives, etc. To my knowledge there has been as yet no coal discovered in our Union that can be ignited with a lighted match. Much has yet to be learned in our Union concerning the products derived from the distillation by various processes. There is no doubt that Germany paid more attention to this than England, or any other country in the world. Why? Because she has the advantage of having her coal beds invariably lying on the naphthene series. I am now endeavouring to prove that our coal beds here lie on the same series as those in Germany, and that the same benefits could be secured here. With regard to coal by-products, the public cannot be too often reminded that not alone is coal of prime importance as a fuel, but also that when suitably handled by the chemist, it yields very valuable by-products which are the raw materials for the manufacture of both synthetic dyes, drugs, and also certain high explosives. Another important by-product obtainable is ammonia in the form of sulphide, which is chiefly used as a fertilizer, especially in the production of foodstuffs. Among other products obtainable by the low temperature distillation of coal, are liquid hydrocarbons of the paraffin and naphthene series, and it is probable that large quantities of motor spirit could be manufactured from it. I do maintain and am certain that the by-products above mentioned will yield and produce a much larger percentage from coal lying at a greater depth, and on the naphthene series, than the coal mines of the Transvaal and Natal, where it does not lie on the same series, and where the mines are only a few hundred feet from surface. The Geological Society in Johannesburg decided, at the time when I was drilling, to send two eminent geologists to examine the deep drilled holes, and to report on them. After remaining here several days, and after examining all the core from these holes, they declared in writing that they were of strong opinion that I was on the petroleum and naphthene series, and that they advised or suggested my going down to 2,500 ft. for that purpose. Now I do not know whether these two geologists had read Stow's works of the "eighties" on the existence of petroleum in the O.F.S. Stow distinctly describes in his works, the area of the existence of this valuable product, and he maintains that at a depth of 2,700 feet petroleum

would be found, not in dolerite or diorite but in sands and dolomite. Now this coal here lies in the described area, and the two geologists were right. The least said of Mr. E. H. Cunningham Craig's recent visit, or of "Prospects of Petroleum in the Union of South Africa," the better. True he has praised the oil shales of Ermelo, Wakkerstroom, and Natal. Mr. Craig's report, so to say, condemns the existence of petroleum in the Union. Can you expect a man coming from Burma, India, and other parts where petroleum exists, to observe the same formation or indications here in our Union, and that in a flying visit of three months? Rather take Stow's works, although he is called "among the ancients." You will obtain more information as to this particular product than from any other works of the "moderns." I believe that the report of the two geologists sent by the Geological Society in 1896 to be correct. I myself have made a thorough study of the existence of petroleum in the O.F.S. and can substantiate what I now say, that these boreholes put down by me here in 1896 are on or near the petroleum or naphthene, so there is no doubt that the coal here is not alone important as a fuel, but will certainly yield a larger percentage of the by-products above mentioned than from coal from any other part of the Union. The reason I so frequently refer to the naphthene series on which our coal beds here lie is that I believe they are similar to those in existence in Germany, which country has been the principal producer and exporter of the world by its by-products from coal. Coal at a shallower depth can also be obtained in the vicinity of Kroonstad, but not on the same series as above mentioned. A careful perusal of the above by those interested in the general advancement of our country will, I sincerely trust, induce them to give their support for the further development of our hidden resources and wealth. You may see in diagram of strata that I was mining, below the 4 ft. 6 in. seam at 939 feet, in a pure white sandstone formation, with streaks of bright coal. This is no doubt a sure indication that superior seams of coal are in existence at a greater depth: when in this formation I stuck, and after a great deal of unsuccessful work had to abandon the hole, leaving a couple of hundred feet. I believe now is the time to put a good concern like this forward, seeing that South African coal is proving itself, and a new export trade has sprung up, through the presence of war conditions, which have sent to South African ports many vessels that at other times would have coaled, or taken coal cargoes on board, elsewhere. South African coal has reached markets whither it had not penetrated before, and permanence may be given to profitable conditions brought about through fresh dispositions of some of the world's shipping. Thanking you for inserting the above.—Yours, etc.,

DAVID H. PRITCHARD.

Kroonstad,
9th March, 1917.

New Heriot.

February returns: Ore milled, 12,400 tons; gold recovered, 4,961 ozs.; profit, £6,027.

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THE CASE FOR METRIC WEIGHTS AND MEASURES.

The *Manchester and London Decimal Association* write as follows:

At present British manufacturers and merchants are compelled to work at the Imperial system of weights and measures for their home trade, and in the metric system for their trade with "metric" markets abroad. The extra work and liability to error attendant on the necessary conversion of a metric enquiry into Imperial terms, and its subsequent re-conversion into the metric system, obviously hamper the British exporter in his efforts to develop his foreign trade. For many years our Consuls abroad have consistently advocated our adoption of the metric system. The ideal arrangement would be the establishment of one international system of weights and measures whereby the producers and consumers of the world could readily communicate without any necessity for conversions. Bearing in mind that, with the exception of the United States and Russia (in both of which countries a strong demand exists in favour of its adoption), practically all other civilised countries have already adopted the metric system, it should be clear that the British Empire can best accelerate the attainment of the above ideal by herself falling into line with these "metric" countries. The scientific and practical advantages of the metric system have already been fully demonstrated, as is evident from its adoption as the universal language of quantity by the scientists of the world and by its practical use in our newer industries, such as the manufacture of motor cars, aircraft, electrical apparatus, etc. Any attempt to impose our chaotic and cumbersome Imperial weights and measures upon the world would not only be foredoomed to failure but bring ridicule upon us. In some quarters there is a tendency to recommend the adoption of a middle course, viz., to decimalise the present British units of weights and measures. The advocates of such an intermediate step have progressed so far as to acknowledge the defects of our present system, and to appreciate the advantages of a decimal basis, but they cannot yet bring themselves to the point of definitely abandoning the British units notwithstanding their inherent defects.

Although the abandonment of the lb. weight and the yard measure in favour of the kilogramme and the metre may sound alarming to some, there can be no doubt that the resultant benefits, accruing to the whole community, would speedily far outweigh any temporary difficulties and inconveniences encountered during the period of transition. In practice it would be found during this period of transition that whereas new standards would naturally be based on the metric system, all existing standards could remain in use for manufacturing purposes until, in the normal course of development, they became obsolete.

SUMMARY.

From the foregoing observations it will be apparent that we should derive considerable assistance from the universal adoption of a decimal system of coinage and the metric system of weights and measures. The extreme simplicity of these rational methods is demonstrated by the fact that, according to expert opinion, their adoption in lieu of our present systems would result in a saving of more than a year in the school life of the average child. This valuable time could obviously be put to good service by, for instance, acquiring some knowledge of science and modern languages. We must expect that Germany's competition for the trade of the world will be more strenuous than ever, and it accordingly behoves us to put our house in order now, instead of complacently postponing our consideration of these problems until after the war. The course of recent legislation proves that the general public is at present more receptive of new ideas than at any previous time in history, an instance in point being the ready adoption of the Day-light Saving Bill.

Our objects, in common with similar Associations in various parts of the country, may be defined briefly as follows:—To urge upon the Government: (a) The early adoption of a decimal system of British coinage. (b) The compulsory use, after a suitable transition period, of the metric system of weights and measures in the United Kingdom, and, if possible, throughout the British Empire.

ANSWERS TO CORRESPONDENTS.

All inquiries addressed to the Editor must bear the writer's name and full address. We cannot reply to inquiries by letter, but telegrams with replies prepaid will be answered. Correspondents are requested to write their names and pseudonyms distinctly.

"J. W. D." (Bulawayo).—The figures in our table show the prices at which sales were effected. In the absence of actual sales the buyers' and sellers' prices are shown. Thanks for your other remarks, which are noted.

"Engineer."—Copies of the report made by Mr. F. W. Harbord for the Transvaal Government may be obtained from the Government Printer at a cost of 6s.

"K. K."—Not the slightest foundation for the rumour.

"Anxious."—The annual report will be issued in a few weeks' time. Better wait.

"W. H. B." (Capetown).—(1) No. (2) Certainly. (3) 10 per cent.

"Wit."—Your question is answered fully in another part of this issue.

"Shareholder."—The Monteleo people are not responsible for the statement. The size of the mine has yet to be definitely proved.

Glynn's Lydenburg.

The following are the particulars of this company's output for the month of February: Tons crushed, 3,870, yielding 1,752 fine ozs.; estimated value of month's output, £7,000; estimated profit for the month, £2,919.

New Companies.

- 5966. The French Tea and Coffee Co., Ltd.—73 Plain Street, Johannesburg; capital £200.
- 5967. Berlyn, Ltd., 10 11, London House, Loveday Street, Johannesburg; capital £5,000.
- 5968. Tenacre Syndicate, Ltd., 106, Fox Street, Johannesburg; capital, £2,000.
- 5969. The Saulspoort Stores and Milling Company, Ltd., Saulspoort, District Rustenburg; capital £3,000.
- 5970. Rajah, Ltd., 66 de la Rey Street, Vrededorp, Johannesburg; capital £3,000.
- 5971. The Victoria General Investment Co., Ltd., 33 Alexander Street, Johannesburg; capital £425.
- 5972. Rand Lime Co., Ltd., Room 305, Third Floor, Corner House, Commissioner Street, Johannesburg; capital £18,000.
- 5973. The Eastern Transvaal Asbestos Syndicate, Ltd.—28 31 Sacke's Buildings, Joubert Street, Johannesburg; capital £900.
- 5974. Yenson's Buildings, Ltd., corner Pritchard and Polly Streets, Johannesburg; capital £1,000.
- 5975. The United Bank and Building Association, Ltd., 52 53, Standard Bank Chambers, Commissioner Street, Johannesburg; capital £2,500.

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THE FEBRUARY GOLD OUTPUT IN DETAIL.

Decrease of 61,313 Ozs.—State Mines and Simmer and Jack Improved Returns—Better Labour Position.

THE February gold output was declared last Saturday at 721,321 ozs., of the value of £3,063,976, a decrease on the January return of 61,313 ozs., and in value £260,442. The output for February, 1916, was 753,594 ozs. The adverse circumstances affecting last month were the strike at the Meyer and Charlton, which lasted for five days, continued trouble with water on the E.R.P.M., and the absence of the Vogel Estate. The Government Areas and Simmer and Jack are the only two producers which show improved returns on January. Decreases are accounted for by the short working month. The labour position shows an improvement.

THE CHIEF FIGURES.

Total output	721,321 ozs.
Value	£3,063,976
Decrease	61,313 ozs.
Value	£260,442
Witwatersrand	696,955 ozs.
Decrease	60,042 ozs.
Value	£2,960,475
Decrease	£255,044
Outside Districts	24,366 ozs.
Decrease	1,271 ozs.
Value	£103,501
Decrease	£5,398
Stamps	9,555
Increase	10

INCREASES AND DECREASES.

	Value.	Increase.	Decrease.
Aurora West	£16,850	—	£1,470
Bantjes Consolidated	19,951	—	3,186
Brakpan	88,897	—	667
City and Suburban	45,234	—	3,288
City Deep	118,885	—	8,645
Cons. Langlaagte	61,070	—	3,822
Cons. Main Reef	41,713	—	1,079
Crown Mines	238,693	—	10,840
Durban Deep	35,112	—	785
Durban Roodepoort	13,720	—	540
East Rand Proprietary	163,287	—	21,387
Ferreira Deep	82,538	—	9,434
Geduld	40,957	—	2,068
Geldenhuis Deep	68,133	—	6,504
Ginsberg	13,916	—	798
Glencairn	13,214	—	693
Government Areas	119,139	£3,993	—
Jupiter	22,487	—	3,046
Knight Central	27,194	—	680
Knights Deep	62,633	—	11,918
Langlaagte Estate	51,882	—	9,179
Luipaardsvlei	19,926	—	761
Main Reef West	27,993	—	2,535
May Consolidated	9,115	—	804
Meyer and Charlton	30,278	—	12,667
Modder B.	89,266	—	12,620
Modder Deep	73,872	—	5,717
New Goch	23,291	—	3,572
New Heriot	21,073	—	1,325
New Kleinfontein	80,342	—	2,340
New Modder	124,115	—	653
New Primrose	11,671	—	2,341
New Unified	13,100	—	998
Nourse Mines	55,233	—	6,533
Princess Estate	27,309	—	1,695
Randfontein	201,475	—	41,075
Robinson	61,002	—	5,050
Robinson Deep	65,530	—	1,936
Roodepoort U.M.R.	32,550	—	3,105
Rose Deep	61,663	—	7,510
Simmer and Jack	68,550	1,406	—

	Value.	Increase.	Decrease.
Simmer Deep	53,561	—	2,795
Van Ryn Estate	41,312	—	1,143
Van Ryn Deep	91,738	—	1,143
Village Deep	70,049	—	7,336
Village Main	38,994	—	3,177
Vogel Estate	—	—	8,253
West Rand Consolidated	34,811	—	6,869
Witwatersrand	47,239	—	4,473
Wit. Deep	49,401	—	1,007
Wolhuter	40,430	—	2,881
Miscellaneous	11,080	1,203	—

OUTSIDE DISTRICTS.

Barrett	896	—	315
Fairview	—	—	514
Glynn's	7,442	—	1,253
Nigel	13,724	—	1,292
Sheba	7,102	—	578
Sub Nigel	20,266	—	446
T.G.M.E.	31,403	—	2,464
Miscellaneous	22,668	1,464	—

NATIVE LABOUR.

At the last day of the month the number of natives employed by the W.N.L.A. and contractors was as follows:

On gold mines	191,095
On coal mines	11,568
On diamond mines	6,268

Total 208,931

The figures for January were: Gold mines, 188,624; coal mines, 11,611; and diamond mines, 5,591.

E.R.P.M.

The results of the operations at the East Rand Proprietary Mines during February are as follows: 820 stamps milled 131,000 tons; 38,411 ozs. fine gold recovered, valued at £159,657; profit for the month, £26,361.

Brakpan Mines.

The February, 1917, output from Brakpan Mines was as follows:—Stamps working, 100; running time, 28 days; ore crushed, 53,100 tons; tube mills working, 10; ore hoisted, 62,624 tons; ore from dump, nil; waste sorted, 11.81 per cent.; fine gold declared, 20,927.62 ozs.; value declared, £88,030, equal to 32s. 11.61d. per ton milled; working costs, £52,860, equal to 19s. 9.57d. per ton milled; working profit, £35,170, equal to 13s. 2.07d. per ton milled.

PERSONAL.

Sir Abe Bailey has returned to the Rand.

* * * *

Mr. Bailey Southwell, the well-known mining engineer, is leaving for England at an early date to join the forces.

* * * *

Mr. Errol Hay will take over the management of the West Rand Consolidated during the absence of Mr. D. M. Morton.

* * * *

Mr. R. Sawyer lately Assistant Manager of the Roodepoort United, has been appointed to a lieutenantancy in the Cape Auxiliary Horse Transport, and has left, at short notice, for Kimberley.

UNION DIAMOND RETURNS FOR 1916.

The diamond returns and output returns for 1916, are as follows:

1 Load = 16 cubic feet. 1 Carat = 205.301 milligrams.

MINES.

DISTRICT AND PROVINCE	Producing during		Hoisting.		Washing.			Production.			Derris Washing.	
			Diamond detons Ground.	Waste.	Ground.	Lumps.	Tailings.	Weight.	Value.	Value per Carat.	Production.	
	Year.	Dec.									Weight.	Value.
			Loads.	Loads.	Loads.	Loads.	Loads.	Carats.	£	s. d.	Carats.	£
Transvaal	2	1	1,617,179	111,135	1,621,110		717,836	518,572.13	652,715	23 10	—	—
Cape	1	1	1,808,775	25,117	1,567,898		—	1,403,511.00	3,393,311	48 4	8,362.00	10,341
Orange Free State	6	5	113,873	188,382	1,839,600	125,888	58,960	218,261.61	723,153	66 4	—	—
Union of S. Africa	9	7	3,569,827	321,931	8,028,638	125,888	776,796	2,170,348.01	1,769,179	43 11	8,362.00	10,341

DISTRICT AND PROVINCE.	ALLUVIAL.					TOTAL PRODUCTION.	
	PROSPECTING SYNDICATES AND COMPANIES FINDING DURING :		PRODUCTION.			Weight.	Value.
			Weight.	Value.	Value, per Carat.		
Transvaal	6	—	66,636.92	280,928	84 4	615,209.35	933,643
Cape	—	—	98,879.75	654,276	132 4	1,510,755.75	4,057,928
Orange Free State	3	1	2,103.50	13,367	127 1	220,365.11	736,820
Union of South Africa	9	1	167,620.17	948,571	113 2	2,346,330.21	5,728,391

New Kleinfontein.

Appended are details of the operations on the property of this company for the month of February: Stamps, 250; days, 24,484; tube mills, 7; tons milled, 62,310; gold recovered, 18,913.947 fine ozs.; net value, £78,492 17s. 7d.; profit, £17,870 17s. 2d.; working costs (excluding development), 17s. 8.498d.; development to working costs, 1s. 9d.; total working costs, 19s. 5.498d.; capital expenditure, £2,073 2s. 2d.

	TOTAL PRODUCTION.	
	Weight.	Value.
	Carats.	£
Progressive Totals from Commencement of Union—		
Year 1915	103,385.73	399,810
Year 1914	2,801,016.57	5,487,194
Year 1913	5,163,545.68	11,389,807
Year 1912	5,071,882.34	10,061,489
Year 1911	4,891,998.55	8,746,724
June to December, 1910	3,043,447.72	4,547,809

A loan of £1,000 at 6 per cent. was made last year by the Government to United Jack Gold Mining Company, repayable from the first profits made by the company. Interest payable half-yearly in advance has been paid to date.

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THE WEEK IN THE SHAREMARKET.

Weak Opening, Firm Closing—Favourites Better.

On Saturday morning the call was delayed owing to the appeal made by the deputy chairman on behalf of the Sailors' Fund. As usual on such occasions, the response was most generous, and a cheque for over £1,110 will be forwarded for the benefit of this most deserving fund. Business was restricted, less than a dozen stocks being dealt in at a generally lower level. Rooibergs had a further hammering, owing to the unsatisfactory report recently published. There was no change in prices on Monday morning, with the exceptions of certain stocks which have been badly hammered recovering some of their lost ground—Bantjes, Randfonteins and Rooibergs, to wit. Montealeos again got above 80s., touching 85s. in the afternoon. Tuesday brought no improvement at the call, only two stocks above par being dealt in, viz., City and Suburbans and Brakpans, the latter making a further improvement. Rand Selections were also slightly harder. Business rather than weakness is at present the prevailing tone of the market. There was rather more activity on Wednesday morning. Knight Centrals were in good demand at improved rates. The market was cleared of Consolidated Mines Selections at 21s. and of Springs at 55s. 6d. On the other hand Kleinfonteins and Consolidated Main Reefs were weak features, the latter especially so in view of the fact that the Neumann interests have been taken over by the Corner House. The market brightened up during the afternoon, Government Areas and Montealeo diamonds being the special features. The opening business on Thursday was mainly confined to Montealeo Diamonds in odd parcels, the top price being 97s. 6d. On call the favourites were all better, especially Government Areas, which continue to keep ahead of Springs. Knight Centrals and Bantjes made further recovery. The two Modders and Rand Selections also hardened, and the weakness in Consolidated Main Reefs continues. The closing quotations for outside stocks were as follows:—Montealeos, 95s. to 100s.; New Compound Diamonds, 12s. 6d. sales; Randfontein Explorations, 2s. 6d. buyers; Old Daggas, 9s. 6d. to 10s.; New Daggas, 17s. buyers; Options, 7s. sellers; Alkalies, 23s. to 24s.; Kings Asbestos, 10s. buyers; Natalites, £10 sales; Henderson's Options, 9d. to 11d.; Invieta, 45s. sales; Phoenix, 9d. to 10d.

* * * *

On Thursday afternoon Springs Mines and Government Areas improved still further, but the morning buyers of Montealeos at 97s. 6d. can't have felt too comfortable when the price dropped to 87s. 6d. At the same time ten shillings was offered for a thirty days' option. On Friday morning the stock recovered to 91s. for odd parcels. The following are the changes in prices from the list: Bantjes, 6s. 9d. to 7s.; Brakpans, 94s. buyers; City Deeps, 77s. buyers; Mines Selections, 21s. 3d. sales; Consolidated Langlaagtes, 24s. sellers; East Rand Mining, 12s. buyers; Government Areas, 58s. 4½d. sales; Knights Centrals, 8s. 7d. sales; Leeuwpoot Tins, 8s. 7d. sales; Lydenburg Farms, 5s. 9d. sales; Main Reef Wests, 4s. 1d. sales; New Modderfonteins, £18 15s. buyers, and sales of 50 shares at £19; Nourse Mines, 22s. 6d. to 23s.; Rand Selections, 65s. 6d. to 66s.; Sub Nigels, 25s. 9d. sales; Springs Mines, 57s. 3d. sales; Van Ryn Deeps, 63s. 3d. sales; Village Deeps, 24s. 6d. sales; and Zandplaats, 8s. 1d. sales. On the whole, the market is decidedly to the good.

* * * *

	Fri. 9th.	Sat. 10th.	Mon. 12th.	Tues. 13th.	Wed. 14th.	Thurs. 15th.
African Farms . . .	7 7*	7 6*	7 7*	7 6*	7 6*	7 7
Apex Mines . . .	7 0	7 2*	7 0	7 1*	7 0†	6 3*
Aurora Wests . . .	13 6*	—	13 6*	13 6*	—	13 6*
Bantjes Cons. . .	6 1	6 1	6 6	6 7	6 7	7 1
Blaauwboosch Diam'd.	90 0†	90 0†	—	—	—	—
Brakpan Mines . . .	88 0*	91 0†	—	93 6	—	—
Breyten Collieries . .	16 0*	—	16 0*	—	16 6*	—
Brick & Potteries . .	—	5 0*	—	5 0*	5 0*	—

*Buyers; †Sellers; ‡ Odd lots; § Ex London.

	Fri. 9th.	Sat. 10th.	Mon. 12th.	Tues. 13th.	Wed. 14th.	Thurs. 15th.
Bushveld Tins . . .	—	0 5*	—	—	0 5*	0 6†
Cinderella Cons. . .	1 0*	1 0*	4 0*	1 0*	1 0*	1 6*
City & Suburbans . .	32 3*	—	32 6*	32 9	32 6	32 0*
City Deeps . . .	77 0	77 0	76 0*	76 6*	76 0*	76 6*
Cloverfield Mines . .	8 1*	8 4*	8 5*	8 5	8 3	8 2*
Clydesdale Colls. . .	13 0	12 9*	12 9*	—	12 9*	12 6*
Con. Investments . . .	18 0	—	17 6*	17 6*	17 6*	17 6*
Con. Langlaagtes . .	—	24 0*	25 0	24 0*	24 0*	24 0*
Con. Main Reefs . . .	—	—	16 0	15 6*	15 9	—
Con. Mines Sel. . .	20 6*	20 0*	20 9†	20 9†	21 0	20 9*
Coronation Collieries	—	—	—	31 0*	—	31 0*
Coronation Synds. . .	—	1 0*	—	1 0*	1 0*	—
Crown Diamonds . . .	—	—	3 0†	—	—	—
Crown Mines . . .	—	50 0*	50 0*	50 0*	50 0*	50 0*
Crown Mines Deb. . .	£100†	—	—	—	—	—
Durban Road, Deep . .	—	—	8 6*	8 6*	8 6*	8 6*
East Rand Centrals . .	9 0*	9 3*	9 3*	9 3*	9 6*	10 0†
East Rand Coals . . .	2 0*	2 0*	2 0*	2 0*	2 0*	2 0*
East Rand Deeps . . .	1 0†	0 11	0 10*	0 10*	0 10*	0 11*
E.R. Minings . . .	10 6*	11 9*	—	—	—	—
East Rand Props. . .	10 0*	10 0*	10 3*	—	—	10 0*
East Rand Debs. . .	£60*	£60*	£60*	£60*	£60*	£60*
Eastern Golds . . .	—	—	1 6†	1 6†	—	1 6†
Ferreira Deeps . . .	24 0*	25 0*	—	—	—	22 0*
F. Smith Diamonds . .	3 4	3 2*	3 6†	3 3	3 0*	3 4*
Geduld Props. . .	39 0	38 6*	38 9	—	38 6	38 6b
Glencairns . . .	1 0*	1 0*	—	1 0*	1 0*	1 0*
Glencoe Collieries . .	9 0*	—	9 0*	9 0*	9 0*	9 3*
Glynn's Lydenburgs . .	—	—	13 6*	—	—	—
Government Areas . .	56 0	56 3	56 0	56 6*	56 3	57 6
Jupiters . . .	6 0*	6 0*	6 0*	6 0*	6 0*	6 6*
Klerksdorp Props. . .	—	—	1 9*	1 9	—	—
Knight Centrals . . .	7 3	7 3†	7 1	7 4*	7 10	8 2
Knights Deep . . .	—	—	—	—	—	21 0†
Lace Props. . .	5 4	5 1	1 10*	4 10*	4 9*	4 10*
Leeuwpoot Tins . . .	10 9*	11 0†	10 6*	—	—	10 6*
Luipaardsvlei Est. . .	7 0†	—	7 0†	—	—	6 0†
Lydenburg Farms . . .	6 0†	—	6 0†	6 0†	5 6*	5 6*
Main Reef Wests . . .	3 0	3 0	3 0	3 6*	3 6*	4 0
Main Reef West Deb. .	£52½†	£40*	£40*	£40*	£40*	—
Meyer & Charltons . .	—	—	100 0*	100 0*	100 0*	100 0*
Middelvlei Est. . .	1 3*	—	1 2*	1 3*	—	1 2*
Modder B's . . .	117 0*	117 6*	119 0†	—	117 6*	118 0*
Modder Deep . . .	—	126 0*	126 0*	126 6*	126 0*	127 0
Natal Navig. Col. . .	18 9*	18 9*	18 9*	18 6*	—	18 9*
National Banks . . .	—	£12†	—	£12†	—	—
New Boksburgs . . .	1 4*	1 4*	1 4*	1 4*	1 4*	1 5*
New Eland Diam. . .	13 6*	13 6*	17 6†	—	—	—
New Era Cons. . .	—	8 6*	8 6*	8 6*	8 8*	8 6*
New Geduld Deeps . .	7 0	7 0*	7 1	7 2	7 2b	7 1*
New Kleinfonteins . .	18 0	17 9	17 9	17 9	17 6	17 9
New Modderfontein . .	—	—	—	£18½*	£18½*	£18½*
New Rietfonteins . . .	1 0	—	0 11*	0 11*	—	0 11*
New Unifeds . . .	—	—	10 0*	10 0*	10 0*	10 0*
Nourse Mines . . .	—	21 3*	21 3*	21 0*	21 3*	21 3*
Premier . . .	150 0†	—	119 0*	140 0*	—	—
Pretoria Cements . .	80 0†	80 0†	79 0*	81 0†	—	80 6*
Rand Collieries . . .	2 3*	2 3*	2 3*	2 3*	2 3*	2 3*
Rand Klips . . .	9 2	9 1*	9 1*	9 0	9 0*	9 0
Rand Nucleus . . .	1 6	1 6†	1 6†	1 4*	1 4*	1 4*
Rand Select. Corp. . .	63 9*	63 6*	63 6*	64 0*	64 0	65 0
Randfontein Deeps . .	—	—	5 9	—	6 0†	6 0†
Randfontein Est. . .	12 6*	13 0	13 9	13 3*	13 9	13 6*
Roberts Vickers . . .	—	11 0†	11 0†	11 0†	11 0†	11 0†
Rooibergs . . .	6 9	5 6	6 3*	6 3*	6 3*	6 3
Rooderpoort Uniteds .	5 0*	5 0*	5 9*	5 6*	5 6	—
Ryan Nigels . . .	—	—	2 0*	2 0*	—	2 0*
Shebas . . .	1 4*	1 3*	1 4	1 3*	1 3*	1 3*
Simmer Deeps . . .	3 0	2 9*	3 6†	2 9†	2 9†	2 9†
S.A. Breweries . . .	30 0†	29 6	—	30 0†	—	—
S.A. Lands . . .	1 0*	4 0*	3 11*	3 11*	3 10*	3 10*
Springs Mines . . .	55 6	55 6	55 3	55 0*	55 6	56 3
Sub Nigels . . .	21 3	21 6*	21 9	21 3*	21 6	21 9
Swaziland Tins . . .	30 0†	—	—	27 6†	—	27 6†
Transvaal Lands . . .	—	—	—	10 0*	—	10 0*
Traus G.M. Est. . .	—	20 0†	—	20 0†	—	—
Van Ryn Deeps . . .	63 9	63 0*	63 3*	63 0*	63 0*	63 3*
Village Deeps . . .	—	—	—	26 6†	—	—
Vogel Con. Deeps . .	—	—	—	—	—	1 6†
West Rand Cons. . .	5 0*	5 0*	5 0*	5 0*	5 0*	5 0*
Western Rand Est. . .	1 8	—	—	1 6*	1 6*	1 8†
Witwatersands . . .	11 0*	11 0*	11 0*	11 0*	11 0*	11 0
Witwatersrand Deeps .	16 6*	16 6*	17 0*	17 3*	17 0*	17 6
Volhuters . . .	10 1†	10 1	10 6	10 6	10 1*	10 1*
Zandplaats Tins . . .	6 9	6 9*	6 9	6 8	6 8	6 8*
Union 5 per cent.—9th.	£100	16s. 9d.†	10th.	£101	6s. 9d.†	12th.
£101 8s. 3d.†; 13th.	£101*	11th.	£101	8s. 1½d.†	15th.	£101 6s. 9d.†

*Buyers; †Sellers; ‡ Odd lots; § Ex London.

THE CONGLOMERATES OF THE WITWATERSRAND.—II.*

Dr. E. T. Mellor's Reply to the Discussion on His Recent Paper.

The questions raised by Mr. Thomas in reference to the Nigel locality affords an opportunity for referring again to a point which has obviously not been made quite clear in my previous descriptions. Minerals characteristic of ordinary mineral veins, like calcite and blende, to which reference has been made, do not occur scattered through the blanket like the gold and the bulk of the pyrites, but as far as my experience goes are always associated with more or less definite veins consisting as usual in such occurrences largely of ordinary vein quartz. Great numbers of such veins traverse the blanket in some localities, and they are also common at the surface over the whole of the area occupied by the Witwatersrand system, as well as in other associated formations. They are of much later date than the rocks they traverse. They have been tested in hundreds of cases by the earlier prospectors and also in the mines, and are almost universally barren of gold, except in such instances as the one already quoted from the New Goch Mine, where the gold they contain is clearly derived from the blanket bed which they traverse. These veins also carry pyrites, usually coarsely crystalline, and sometimes in comparatively large masses. These might be expected to be associated with very rich gold occurrences, but are almost invariably found to be entirely barren. The pyrites associated with the richest occurrences of gold is quite different, both in appearance and in distribution, from that occurring in such mineral veins, and in many other ways conveys the impression of having an entirely different origin. The coarse pyrites which frequently occurs abundantly scattered through the conglomerate, and often obviously replacing portions of the pebbles and matrix, is very similar in appearance and general character to that associated with the small mineral veins referred to, and is most probably of a similar age to them and of considerably later than the conglomerate itself. Like the coarse pyrites in the veins, it appears to have no connection with the gold, since its presence even in considerable abundance has no obvious effect on the value of the conglomerate. On the contrary, an abundance of pyrites of the other type, which differs considerably in appearance, relationship and distribution, and which gives the impression of being a modified form of an original constituent of the reef, is almost invariably associated with high values. In my opinion these two types of pyrites are of entirely different age and origin, and the one which is associated with evidences of the introduction of new elements into the conglomerate is the one which appears to have no relation whatever to the principal gold contents in the blanket.

With regard to the circulation of solutions through the conglomerates, is it necessary to suppose that such solutions required definite channels? In the case of fully consolidated formations one naturally looks for definite channels to allow of the passage of liquids through such impervious masses, as has been the case in the formation of the later mineral veins found in the Rand formation referred to above. But, like any other similar group of sediments, the Rand rocks, before attaining their present condition, must have existed for a considerable time, first as unconsolidated sandy and pebbly beds, and later as more or less porous and partially consolidated sandstones and conglomerates. During these stages surely there would be no difficulty in the whole formation being saturated by water containing various materials in solution. If ordinary sea water is capable of holding a certain amount of gold in solution, there does not seem much difficulty in slow recrystallisation of gold going on in such a saturated mass, especially when several well-authenticated instances are known of the recrystallisation of gold in recent deposits close to the surface. In the early stages of consolidation of the formation, and while still the conglomerate beds remained not far removed from the surface, the individual patches of the Nigel district would be easily accessible from all sides to percolating solutions. On the infiltrationist view, however, that such conglomerates afford practically the only path, while the surrounding material without pebbles was practically impervious, the individual conglomerate patches of the Nigel district were practically isolated, and it seems only fair to look to the infiltrationists for an explanation of how under these circumstances the gold was introduced into them. Regarded as placer deposits, in which the gold was laid down with the pebbles, these isolated patches offer no difficulty whatever. Professor Gregory's conception of the conditions under which the conglomerates of the Main Reef Group were deposited is, I think, considerably different from that which I tried to outline in my paper. Professor Gregory pictures the conglomerates as having been deposited along a shore which was doubtless rocky, and along which there must have been many rivers discharging into the sea. The existence, both of a rocky

shore anywhere in the vicinity of the area in which the conglomerates were laid down, and of numerous comparatively small streams, appears to me quite incompatible with many of the most essential and striking features of the Main Reef Group, particularly of the Main Reef Leader and the South Reef. Many features in the Lower Witwatersrand System seem to me to point unmistakably towards uniform deposition over very large areas, and this type of deposit is continued up to the stage at which the Main Reef Group was laid down, after which it probably underwent a progressive modification.

The point appears to me of importance, as the explanation of some of the most peculiar and characteristic features of the conglomerates, especially such a bed as the Main Reef Leader, depends upon one's ideas as to the conditions prevailing at the time of their deposition. The point is one already referred to in my reply to Dr. Young's discussion of my paper as read before the Chemical, Metallurgical and Mining Society of South Africa. Professor Gregory's conditions would surely make out the Main Reef to be a basal conglomerate, a conception which also led him to regard the extension of the auriferous character of these beds to the south of the present Rand as depending on the occurrence of gold in the older rocks in that area. The many thousands of feet of conformable strata underlying the Main Reef are lost sight of in such a conception. Professor Gregory says that it was some of the facts clearly stated by me that led him to regard the conglomerates as, in the main, beach deposits, and he instances the remarkably long horizontal persistence of the Main Reef Leader as more indicative of formation along a coast than in a delta. But while the horizontal persistence is a most remarkable feature in the Main Reef Leader, its persistence in a direction at right angles to this is more remarkable still. This is a point which Professor Gregory does not take into consideration, and it seems to me precisely the one which militates more against the conception of the Main Reef Leader as a deposit laid down in a narrow belt along a rocky shore, and to point to the existence of conditions such as those suggested in my paper. Again, the uniformity in the size and shape of the pebbles on the Leader is scarcely what could be expected had a number of comparatively small rivers discharging along a rocky shore contributed to its formation, while such uniformity might well be looked for under the other view. It is very essential, in considering even such a limited group of reefs as the Main Reef Group, that the various members should be carefully distinguished. The Main Reef and Main Reef Leader offer many points of difference between themselves, and it is by no means certain that both were formed under parallel conditions. We know far less about the Main Reef than we do about the Leader, and especially we are not able to follow it in various directions as we can the Leader in the Far East Rand. It was for this reason I laid especial emphasis on the evidence from the Leader in my paper. The differences existing between the various members of the Main Reef Group is a point which I hope to be able to treat more fully at some future time. Mr. Goodchild contributes some interesting results of investigations into the possible part played by pyrites in the redistribution of the gold on the blanket. Its possible migrations within the Witwatersrand System is a subject to which I was unable to devote much space in my paper, but one which is both important and interesting. Personally, I think it most probable that, except in rare instances, there has been very little migration, and that only over very small distances. Mr. Goodchild, with others, is inclined to look to the Klipriviersberg Amygdaloid as being a likely agent in bringing about changes in the blanket, particularly through the agency of dykes. Although this is a question to which I have given some attention during my work in the field, I know of no clear instances of dykes penetrating the Witwatersrand System which can be certainly connected with the extension of the Klipriviersberg Amygdaloid, and, moreover, the main body of that rock appears to have had scarcely any effect even upon those quartzites and conglomerates which lie very much nearer to it than do those of the Main Reef Group.

(To be continued.)

The New Vaal River Diamond and Exploration Company, Ltd., Sydney-on-Vaal, near Kimberley, has decided to throw open, on March 20th, 1917, the area at Droogeveld, consisting of upwards of 10,000 claims, known as the "River Diamonds Syndicate Claims," and which is believed to be rich.

*From the Bulletin of the I. of M. and M.

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THE WEEK IN THE MINING MATERIAL AND ENGINEERING TRADES.

Feeling the Approach of Scarcity—Electric and Steam Power in Demand—New Steel Works at Denver—Electrical Vehicles—American Shipping Competing for S.A. Trade.

The keynote of the position to-day is that fears are often expressed that we are gradually feeling the approach of a scarcity of mining material in the merchants' stores in Johannesburg, as distinct from the large quantities of stores accumulated by the mines, but mines, of course, which are situated on the Witwatersrand and controlled by wealthy groups. The question of strenuously wearing out material was emphasised by the Chairman of the Glencoe Collieries at their annual meeting on Wednesday last. He stated that hitherto the complaint had been a shortage of trucks, but recently it has become more apparent that the reason of the shortage of transport was not so much a shortage of trucks as now a scarcity of engines. The fact was that the locomotives are of necessity being used long after they should be in the workshop for overhauling and repairs, and as a consequence very many of these are getting into bad order, and very few new engines are available. This feature of the power position, both steam and electrical, must be viewed with a certain amount of misgiving, and in the case of the railways it may eventually mean a curtailment of passenger traffic. As regards electrical power, one group alone has purchased something like ten thousand pounds' worth of electric motors, which has in a measure made a pretty clean sweep of the motors available in Johannesburg.

THE SEARCH FOR ELECTRIC AND STEAM POWER.

It is recognised that now it is impossible to obtain new mining machinery, and other machinery as a matter of fact, the mining companies are beginning to regret having broken up all their old driving engines, as to-day they might have been patched up and so gone on for another spell of work. However, the search continues for engines, hauling gear, and other tackle required in making a show of mine work on the Government ground recently let out under two mining area leases. In addition to our own requirements on the Rand, the Rhodesian gold mines, and the Natal coal fields have come into our market more and more, mostly for steam power and all its intricate appliances for driving purposes. Hence the demand has apparently overtaken the supply, therefore values have stiffened very considerably, being up anything from twenty-five to fifty per cent.

NEW STEEL WORKS.

It will be a surprise to most people that a brand new American steel works is being started within the precincts of the Johannesburg Municipality. There has been a lot of quiet work and negotiations going on for some months past and at last there are signs in evidence that an actual start is being made at Denver. The promoters secured a large piece of land, adjoining the main line with a railway siding, which was originally used by a responsible Johannesburg electrical firm, who sold it for a few thousand pounds, for the new scheme. Hence it is only natural to assume that ample funds are behind the promoters to carry the thing through. The representatives are very reticent for the time being until perhaps their scheme is more matured. Ostensibly the new enterprise will be for the manufacture of steel and iron, and it is said the steel products will be made under a secret process, therefore steel will be pushed for all it is worth, so that the iron output as a separate proposition will be quite a secondary matter. If anything like success is manifested as regards the quality and utility of the steel, what a vision of wealth opens up to view, as all the world is just now looking for steel in all its various forms. Here, it must be admitted, is an unlimited market at the very furnace doors, always providing it is a passable

substitute for the overseas article from Great Britain and America. Never was such an opportune moment, as the Chamber of Mines is in that happy mood to help and assist new industries to supply the essentials for the mines. Thanks also to this continuous encouragement given by the mines to the engineering shops and foundries, the latter were able to accept an order which is now being completed in Johannesburg for some extra large pans for the use of the copper mines at Gwelo, Rhodesia.

ELECTRICAL GOODS AND VEHICLES.

There is an abundance of wire for house lighting purposes, but a shortage of lamps in some voltages. For example, those used in mines of 110 volts are noticeably getting scarce. Business is very good for those firms having just the right goods and all assortments are being absorbed without adequate replenishment. Eleven electrical vehicles were imported from America in anticipation of an order from the Post Office. Before that happened, an experiment was made by the Post Office authorities on two specimens imported some time ago. The trial lasted over several months, and at the finish the Postmaster-General with his engineers personally inspected the vehicles, hence the order and now the red vehicles can be observed running about Johannesburg and suburbs. One secret of their success is that a special charging depot must be arranged, which has been done at the garage owned by the importing firm, and the Municipality has, it is understood, met the Post Office in the matter of electricity charges, arranged upon a sliding scale. Hence, as compared with the ordinary petrol motor, weight for weight, the electric vehicles are run to-day at about half the cost of the ordinary petrol motor. Another point to be mentioned is that the electric motor should be at work daily to insure the best results in the matter of charging the cells, which should be practically continuous, as deterioration takes place if the machine is laid by and so become altogether void of the electricity.

GALVANISED IRON AND OTHER GOODS FROM AMERICA.

Some importers foresee relief in most mining material from America. For example, roofing iron is quoted from there, from what is termed outside sources, rather freely, and as the price has again risen another halfpenny per foot here this week, some little consternation might have ensued, but the fact is that importers think we are at high-water level, viz., 1s. 2½d. per foot for 12 ft. lengths. It appears pretty certain that some belated orders are on their way from Britain, as well as America, and when these arrive values are expected to recede a trifle. The secret of these hopes for obtaining somewhat of a general relief from American sources, is that ship owners are now competing for cargoes from New York to the Cape at the exceedingly high freight of £7 per ton for mining material, as compared with 32s. 6d. in pre-war days. Another reason is that the route in question is without the war zone, hence fairly free of danger, except for an occasional enemy raider. If there

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WRIGHT'S ROPES

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is anything but a *fait accompli*, and it comes from a responsible quarter—the congestion of goods at New York, destined for South Africa, should be quickly relieved.

INTERESTING MISCELLANEOUS ITEMS

A large demand company has been purchasing wire ropes very freely, hence an increased scarcity, and they were anything but plentiful before. A special permit has to be obtained to export wire ropes from Great Britain, and the American article is higher in price at first cost, and then comes the high freight. There is a special scarcity of tram trucks and in a measure the shortage extends to all tram materials. Rhodesia is more and more in our market, as they are evidently waking up to the fact that the apparent ample stocks which had been accumulated may not last out the war conditions. This presumption is from hints given in the ordinary passing commercial correspondence. The constant and good business with the Natal coalfields has developed to such an extent that it is now taken as a matter of course. The firms dealing in agricultural machinery have secured their stands at the forthcoming show next month, but fears are entertained that the assortment, whilst not lacking interest, will not perhaps be as varied as usual. However, in this and other respects it is surprising what a difference the war news makes throughout all circles in Johannesburg because at the beginning of the month things were a bit under a cloud, but now the fall of Bagdad and the advance on the western front practically turn the pessimistic views into those of optimism.

REVISED PRICE LIST.

Approximate war prices, subject to quick change.—Mining and building hardware: Iron, imported, $\frac{1}{4}$ round, 10s.; up to 1 in., 32s. 6d.; 2 in. to 6 in., 27s. 6d. per 100 lbs. Ditto, square, up to 1 in., 27s. 6d.; $1\frac{1}{2}$ in. to 2 $\frac{1}{2}$ in., 25s.; 2 $\frac{1}{2}$ in. to 5 in., 25s. Flats, 3-16 in., 37s. 6d.; all from $\frac{1}{4}$ in. up, 35s. Angles, $\frac{3}{8}$ in. to 3-16 in., 40s.; $\frac{1}{2}$ in., 10s.; 5-16 in. to $\frac{3}{4}$ in., 30s., excepting 5 x 4 x $\frac{1}{2}$ in.: mild steel bar, 4 $\frac{1}{2}$ lb.; drill, 7 $\frac{1}{2}$ lb.; steel plates, 10 ft. by 1 ft. by 1-16 in., 42s. 6d.; $\frac{1}{2}$ in. by 3-16 in., 40s.; $\frac{1}{4}$ in. to 5-16 in., 35s.; $\frac{3}{8}$ in., up to 30s.; 10 ft. by 5 ft. by 1-16 in., 42s. 6d.; $\frac{1}{2}$ in. and 3-16 in., 40s. to 45s.; $\frac{1}{4}$ in. to 5-16 in., 37s. 6d.; $\frac{3}{8}$ in., up to 35s.; intermediate sizes up to 12 ft. by 6 ft. by 1-16 in., 42s.; $\frac{1}{2}$ in. and 3-16th in., 34s. 6d.; $\frac{3}{4}$ in. and 5-16th in., 33s.; $\frac{3}{8}$ in. and up, 32s., all at per 100lb.; hexagon and cuphead bolts, $\frac{1}{2}$ in. dia., 1s. 9d. lb.; 5-16in. dia., 1s. 6d. lb.; $\frac{3}{8}$ in. dia. up to 3 in. long, 1s. lb.; $\frac{3}{8}$ in. dia., 11d.; 3 $\frac{1}{2}$ in. and up long, 11d. lb.; $\frac{1}{2}$ in. dia. up to 2 $\frac{1}{2}$ in. long, 62s. 6d. 100 lbs.; $\frac{3}{8}$ in. dia. and 2 $\frac{1}{2}$ in. up long, 60s. 100lbs.; $\frac{1}{2}$ in. dia. up to 2 $\frac{1}{2}$ in. long, 55s. 100 lbs.; $\frac{3}{8}$ in. dia. 2 $\frac{1}{2}$ in. and up long, 52s. 6d. 100 lbs.; $\frac{3}{8}$ in. dia. up to 2 $\frac{1}{2}$ in. long, 52s. 6d. 100 lbs.; $\frac{3}{8}$ in. dia. 2 $\frac{1}{2}$ in. and up long, 50s. 100 lbs.; $\frac{1}{2}$ in. and 1 in. dia., same price as $\frac{3}{8}$ in. diameter; nuts, $\frac{3}{8}$ in., 1s. 3d. lb.; $\frac{1}{2}$ in., 65s.; $\frac{3}{4}$ in., to 1 $\frac{1}{2}$ in., 62s. 6d.; 1 $\frac{3}{4}$ in. and 1 $\frac{1}{2}$ in., 70s.; 1 $\frac{1}{2}$ in. to 1 $\frac{3}{4}$ in., 75s.; 2 in. up, 85s.; washers, all sizes, 45s.; rivets, 3-16in., 1s. 6d. lb.; $\frac{1}{2}$ in., 5-16in., 1s. 3d. lb.; 7-16in., 3 in., 9 $\frac{1}{2}$ d. lb.; $\frac{3}{8}$ in., 52s. 6d.; $\frac{1}{2}$ in., 50s.; $\frac{3}{4}$ in. up, 49s. 100 lbs.; shoes and dies, 32s. 6d. to 35s. per 100 lbs.; rails, £23 per ton; picks, 4lbs., 27s. per doz.; shovels, 32s. 6d. to 50s. per dozen; drill hammers, 5 $\frac{1}{2}$ d. lb. to 6d. lb.; hammer handles (best American), 14 in., 3s. 6d., 24 in., 7s., 30 in., 9s. 6d., 36 in., 13s., per dozen; metal, anti-friction, 1s. per lb.; galvanised iron, 24 gauge, 6 ft. to 10 ft., 1s. 1 $\frac{1}{2}$ d., 11 ft., 1s. 1 $\frac{1}{2}$ d., 12 ft., 1s. 2 $\frac{1}{2}$ d.; 26 gauge, 6 ft. to 8 ft., 10d.; 9 ft. and 10 ft., 10 $\frac{1}{2}$ d.; flat galvanised, 18 to 24 gauge, 40s.; 26 gauge, 12s. 6d. 100 lbs.; floor brads, 10s.; ceiling, 12s. 6d.; wire nails, 37s. 6d. to 55s. per 100 lbs.; solder, 50 per cent., 1s. 3d. per lb.; locks, rim, 48s.; mortice, 60s. dozen; barbed wire, 26s. to 30s. 100 lb. coil.

Timber: Deals, Baltic, 9 x 3, short and medium, 1s. 1 $\frac{1}{2}$ d.; longer lengths, 1s. 2 $\frac{1}{2}$ d. to 1s. 3d. (Oregon, 1s. 1d.); flooring, 1 $\frac{1}{2}$ x $\frac{3}{4}$ and 6 x $\frac{3}{4}$, 6 $\frac{3}{4}$ d. per sq. ft.; do., 4 $\frac{1}{2}$ x 1 $\frac{1}{2}$, 9 $\frac{1}{2}$ d.; and 6 x 1 $\frac{1}{2}$, 9 $\frac{1}{2}$ d.; ceilings, 6 x $\frac{1}{2}$, 3 $\frac{1}{2}$ d. to 3 $\frac{1}{2}$ d. per sq. ft.; Oregon, 4 x $\frac{1}{2}$, 4 $\frac{1}{2}$ d.; pitch pine, 8s. per cub. ft.; Oregon, 5s. 9d. to 6s. per cub. ft.; clear pine, $\frac{1}{2}$ in. x 12 in., 7 $\frac{1}{2}$ d. per ft.; 1 in. x 12 in., 9d. to 10d.; teak, small planks, 14s. 9d.

per cub. ft., do., large, 15s. 6d., paraffin, 9s. 6d. per cub. ft., poplar, 1 in. x 12 in., 10d.; scuffling, 1s. 1 $\frac{1}{2}$ d. to 1s. 2d. per ft., 3 x 9.

Bricks, cement, lime, etc.: Cement, nominal, 31s. 6d. per cask; Pretoria Portland, 9s. 3d. per bag; 8s. 3d., truck loads; lime, white, 7s. 9d.; truck loads, 6s. 9d.; slaked, do., 5s.; blue, 3s. 3d.; plaster lime, 4s.; bricks, stock, delivered, 37s. 6d. to 45s.; wire cuts, 50s. to 70s., pressed 70s. to 80s. per 1,000, road transport difficult to obtain; salt and white glazed bricks, £27 10s. per 1,000; tiles, roofing, £17 $\frac{1}{2}$ square; glazed tiles, 10s. 6d. to 17s. 6d. yard; paving cement tiles, 8s. 6d. yard laid; terra cotta tiles, £15 per 1,000; reinforced concrete columns, 6 ft. plain, 22s. 6d., fluted, 24s.; fireclay bricks, £9 $\frac{1}{2}$, good average, per 1,000; clay chimney pots, 80s. per doz.; fire clay, 37s. 6d. ton on rail.

Oils, paints, lead, oxides, glass: Linseed, raw and boiled, 32s. 6d. per 5 galls.; white lead, 71s. 100 lbs., 72s. 6d. 500 lbs.; turpentine, 51s. per 2 $\frac{1}{4}$ galls.; 10/4, 58s. 6d.; coal tar, imported, 10s. to 12s. 6d. per 5 galls.; oxide in oil, 36s. per 100 lbs.; dry oxide, 22s. 6d. to 25s.; S.A. crude oxide, 12s. 6d.; linseed oil putty, 1s. 6d. per 12 $\frac{1}{2}$ lbs.; bladders, 36s. casks of 100lbs.; grease A.F. axle, 23s. 6d. to 25s. per 100 lbs.; tallow, 1s. per lb.; White Rose paraffin, 17s. 3d. 2/5; Laurel do., 17s.; petrol, 27s. 6d. 2/4; motor oil, 6s. to 7s. 9d. per gall.; engine lubricating oils, 25s. to 36s. 6d. per cask; cylinder, 26s. to 40s.; paints in tins, 10d. to 1s. per lb., according to quantity, and if ordered to be mixed, 20 per cent. on pre-war rates. British plate-glass, 4in., 3s. 6d.; do., mirror, 4s. 6d.; window, 16oz., 1s. to 1s. 3d. foot.

Chemicals: Mercury, £22 per 75 lb. bottle; bichromate potash, 3s. 6d. lb.; chlorate, 3s. lb.; permanganate, 10s. 6d. lb.; alum, 5d. lb.; carbolic acid, 6s. 6d. lb.; borax, 87s. 6d. 100 lbs.; cyanide soda, 1s. 5d. lb.; hypo, 9d. lb.; acetate lead, 75s. 100 lbs.; litharge (assay) 70s., (commercial) 57s. 6d. 100 lbs.; zinc sheets and blocks, 1s. 6d. lb.; plumbago crucibles, 5d. per number.

Electrical Goods: Lamps, high volts., British, Holland & American, 18s. to 21s. wholesale, and 21s. to 30s. dozen, retail; carbon lamps, 7s. 6d. per doz.; pure rubber flex, 5d. to 6d. per yard; 3 20 coils of wire, 27s. 6d.; do., 3/22, 23s. 6d.; tubing, 11s. to 15s. 100 ft.; keyholders, 4s. 6d. to 5s. each; round blocks, 3 $\frac{1}{2}$ in., 3s. 6d. doz.; lamp holder cord grips, 13s. 6d. to 14s. 6d. doz.; switches, 5 amp., 17s. 6d. to 20s. doz.; British glass shades, 24s. to 36s. doz.; Bohemian shades finished; porcelain shackles, 14s. 6d. doz.; do., bobbins, 10s. to 12s. per 100; cleats, 18s. per 100; P.O. insulators, 18s.; motor, 3 h.p., about £35 to £37, new.

Notices of Reduction and Increase of Capital.

E. and S. Company, Limited, Johannesburg: reduced from £7,500 to £100.

Daggafontein Mines, Limited, Johannesburg: increased from £530,000 to £630,000.

Johannesburg Motor Mart, Limited, Johannesburg: increased from £12,000 to £55,000.

The Transvaal Soap Company, Limited, Johannesburg: increased from £40,000 to £60,000.

In Liquidation.

The following companies have been placed in liquidation:—

3128. Auto Grip, Limited, Johannesburg: voluntary.

1537. Rock and Company, Limited, Johannesburg: by order of the court.

2588. The Tube Mill Linings, Limited, Johannesburg: voluntary.

2893. Boksburg Potteries Syndicate, Limited, Johannesburg: voluntary.

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Engineering Notes and News.

S.A. INSTITUTE OF ELECTRICAL ENGINEERS: PRESIDENTIAL ADDRESS.

[By W. H. PERKOW.]*

Before dealing with the subject of my address I feel I cannot allow this opportunity to pass without making a brief reference to one or two current topics. In the first instance, one feels that all our present transactions are constantly overshadowed by the enormous struggle that our Empire and Allies are engaged in for the righteous cause of a world freedom and liberty. We rightly admire the glorious rally and the stand taken by them to protect the rights and privileges of the weaker and oppressed nations, and we appreciate how necessary it is to firmly and finally impress this fact upon our enemies, that in future these privileges, along with international laws, must be respected. To-night we join the Motherland and those who are directing the destinies of the Empire in the hope and prayer that such success may be given to our arms during the next few months that ere the year 1917 draws to a close a victorious peace may be proclaimed the world over. And here I would venture to say that I have no sympathy with the sentiment in this present struggle of a "peace without conquest." We and our Allies must aim at nothing short of that stated at the opening of the British Parliament by His Majesty the King—"Restitution, reparation, and future guarantee of peace." It is a pleasure to know that so many of our members are to be found among those in Europe and East Africa who are giving their all to bring about this issue—Victory. No less than 63 of our members are serving in this manner. We have previously stated how truly proud we are of the distinctions some have achieved and of the good work all are doing. With deep regret we have had to announce that no less than four of our number have fallen in the field, and a great many more have been wounded and contracted diseases which may handicap and follow them for years. In this particular it was assuring to read recently from the home papers of a statement made by a responsible person to the effect that so far as the Dominions were concerned we could rest assured that the splendid work put in by this and other colonies would not be without reward, and that Germany would never again have restored to her the colonies which the Dominions had won at so great a sacrifice. Again we express our unstinted praise of the magnificent work done by the British Navy. I fear that the fact of what this protection has meant to us in South Africa is oftentimes either forgotten or thought too lightly of. Ever since this great struggle has been raging we in this country have been able to pursue our avocations, enter as fully as ever into all our business and domestic concerns, and even enjoy to the full the pleasures and gaieties which existed before the war. I believe, gentlemen, without taking too serious a view of the protection afforded us by the Navy, that we in all probability owe our very existence, and certainly owe the vast amount of business facilities and domestic comforts, to the work of "The Grand Fleet." We are pleased to note that a great many in the city are awake to these facts, and show their appreciation by the calling of public meetings, giving of lectures, forming branches of the Navy League, arranging for public subscriptions, and trying to arouse enthusiasm in the youth of this country to fall into line and fill the gaps made by the gallant fellows who have paid the penalty for their bravery.

* Read before the S.A.I. of E.E.

In view of all that we know is being done for us, may I ask the question if we are doing all we can to inflict a speedy and final blow on our enemies who would wish to set the clock of civilisation back for hundreds of years and deal out serfdom, tyranny, and oppression in its stead. Great Britain is doing a tremendous work in order to cope with, and provide for, the necessities of the people. Parks are being ploughed up and tilled, many patriotic people are turning their tennis courts and lawns into vegetable gardens. The railway companies are letting in allotments the waste land running parallel with the lines to their employees, and in a thousand other ways an effort is being made by rich and poor alike to provide against possible shortage, and now there is a probability of imported luxuries being discontinued. If they are making such sacrifices one may well ask—what are we doing? The call for help has reached this country in many ways and through various agencies. South Africa's opportunity has arrived, the chance of manufacturing goods, etc., that cannot reach us from other sources is ours, and the opportunity to increase our present outputs. As an Institution we have done a great deal by investigation, to place on record and to bring before the powers that be what could be done with cheap power and the raw material at our disposal to establish staple industries for the manufacture of products for which there is a steady and growing demand in this country. I am pleased to state that your Council are not satisfied merely with what has been done; they feel the urgent need there is for immediate action of some sort, and have appointed a committee to investigate the matter carefully, and I trust that some useful work may accrue therefrom. I believe there is an outlet at the present moment for every effort, however small, that we are prepared to put forth to assist in inflicting the final blow to our adversaries. We may not, for a host of reasons, be able to throw our entire weight into this world struggle, but let us, either as individual members or collectively, ascertain if there is any way by which we may render assistance.

THE INDUCTION COIL.

I wish now to address you on the subject of the induction coil, reviewing its early history, subsequent development, and some of its applications. It is not my intention to deal with, or even refer to, all that has grown out of Michael Faraday's discovery of the theory of induction. I desire to speak of that form of apparatus styled the shocking coil, high tension coil, and inductorium. It is nearly ninety years since Faraday conducted his first experiments on induction. He

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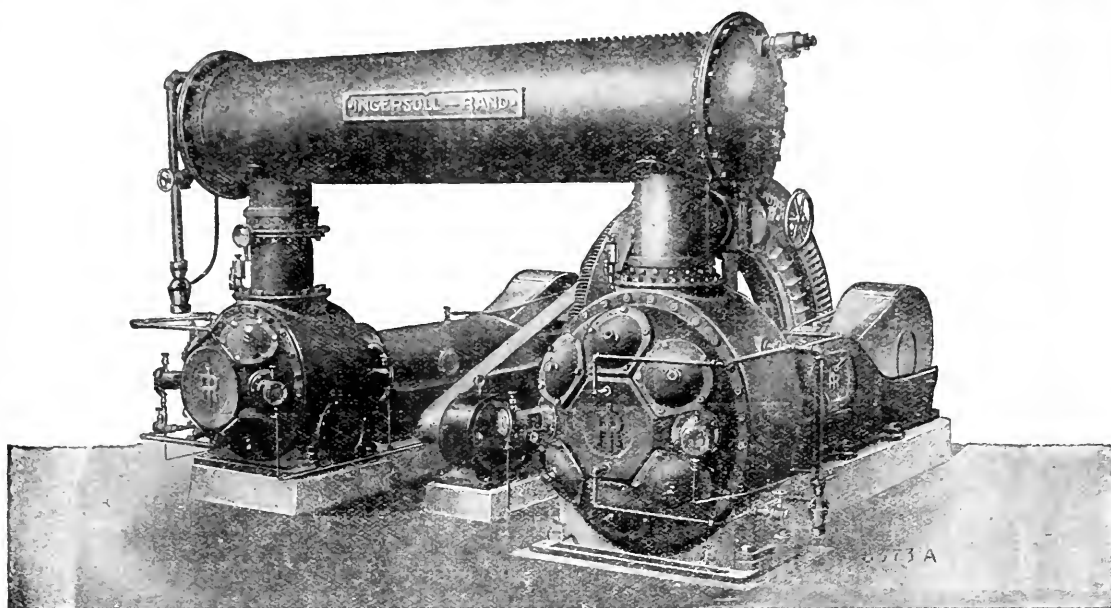
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discovered that when two layers of insulated wires were wound on an iron ring (the coils or layers being independent of each other), that by connecting the ends of coil No. 1 in series with a battery or some form of interrupter, and by connecting the ends of coil No. 2 to the terminals of a galvanometer by closing and opening the battery circuit of coil No. 1, he caused a current to flow in coil No. 2 which deflected the needle of the galvanometer. He also discovered that the current induced in coil No. 2 was in the opposite direction to that of the inducing coil No. 1 at making of contact, and in the same direction when the contact of coil No. 1 was broken.

Current at Make.—In later years this former or reverse current has been the subject of much concern both to makers of modern coils and users of the same. Faraday exhibited his first induction coil at the Royal Society in 1831, and this apparatus is still preserved by that institution. It would appear that the earliest difficulty encountered was the making of an efficient break. In the first experiment this operation was performed by hand, simply touching and removing one part of the primary and battery circuit. It will be interesting to note the time given and progress made with this important piece of apparatus. In 1836, Page of Boston made a great advance by constructing a break in the form of a toothed wheel, which on being revolved made contact with a flat spring and being capable of interrupting the circuit from 10 to 40 times per second. The speed and control of this interrupter was a decided success. Shortly after Page's invention came that of Callan's, of Ireland, who devised the first vibrating spring and hammer break. This pattern is familiar to all of us, and is still used on small coils and the ordinary house bell. About this time Fizeau, of France, came to the rescue of the coil with still another improvement. He discovered that the apparatus was greatly improved by placing across the interrupter terminals a condenser, the spark at break was considerably lessened, and the secondary discharge heavier and of greater length. In a very few years after the making of the first induction coil it was found to possess valuable physiological effect, and was soon adopted by the medical profession as a remedial agent. Foremost among such workers was Duchene, of Boulogne, who was an outstanding figure in 1850 for the marvellous work he accomplished by the treatment of paralysis with the induction coil. He designed coils for his particular work. Other designers of medical coils were Storher, Weiss, Du Bois, Redmond, and others. The last-named constructed what is still known as the sledge coil, which is still largely in use to-day for medical application and physiological research work. The secondary coil was arranged to slide over the primary winding, and in that way received its means of regulation. For the further regulation of the secondary current he devised the water regulator or Rheotome. In 1867 came yet another success. Rhumkorff raised the coil to the status of a high tension apparatus, and named his apparatus the Inductorium. He found that when wound for greater output than previously it was possible to do practically all the work done by the frictional machine. With the aid of Fizeau's condenser and Wagner's electromagnetic break, carrying a rod and weight to alter the interruptions per second, he succeeded in building a coil giving 16in. sparks and containing no less than sixty miles of wire on the secondary. This was an instrument truly great. Coil builders and users now grew apace. These improved coils were used in the laboratories for research work.

It may prove of interest here to give you the particulars of two or three famous coils built by different makers. Soon after Rhumkorff completed his, Ritchie made one for Cassiot with a core of soft iron wires 18in. long. The primary contained three layers of No. 9 gauge covered wire. The secondary was wound in three sections, the first section containing 22,500 feet of 32 gauge wire, the other two sections contained 23,575 feet of 33 gauge wire. The condenser was also in three sections and capable of combination. With five Bunsen cells, each section gave a spark of 5in. and the combination a spark of 12½in. The great Polytechnic Coil had an overall length of 9ft. 10in., its diameter being 2ft., and its total weight was 15 cwt. It contained 477 lbs. of ebonite, the core was 5ft. long and of 16-gauge iron wire 4in. diameter, and weighed 123 lbs. The Primary 145 lbs. of No. 13 gauge, or 3,770 yards having 600 turns, resistance of 2,204 ohms. The secondary contained 606 lbs. of fine wire, or 150 miles in length, having a resistance of 33,560 ohms. It was wound on an ebonite tube 8ft. long and a ½in. thick, the winding itself occupying 4ft. 6in. in the centre of the tube. It had a 6-part condenser. When worked with five Bunsen cells it gave sparks of 12in., and with fifty cells it yielded 29in. sparks. History records the fact that the life of this coil was short (Sept. 21, 1869). The only other coil of note made about this period was that constructed by Appo, the celebrated English coil builder. It was constructed for Mr. Spottiswood. The following data will give you a fair idea of the achievement: It had two separate primary windings, the one had a core of 4in. long by 3½in. diameter, and weighing 67 lbs. Primary winding 660 yards of 4/06, weighing 55 lbs., being six layers with 1,344 turns, resistance 23 ohms. No. 2 core, 4in. by 3½in., weighing 92 lbs. Primary 506 yards, weighing 81 lbs. in three layers. The wire in the secondary was no less than 280 miles in length, with a resistance of 110,200 ohms, 6 mmtr. in 4 sections with 200 layers in each and having a total number of turns of 341,850. With five Bunsen cells (part size) it gave 28in. sparks, and with 30 cells no less than 42in. sparks. If you carefully compare these figures at your leisure you will see what a great advance and achievement this later coil was. Many other large Inductoriums were made by Brown of Belfast, Ladd's of London, Gaiiffe of Paris, etc. This state of advance of the coil, together with the discovery by Sir William Crookes of the vacuum tube, made possible in the year 1895 the discovery of X-rays by Prof. Rontgen, and later, in the year 1896, wireless telegraphy by Marconi two of the greatest discoveries of the past hundred years. From the date of these discoveries the induction coil

commenced a career in the medical, surgical, and commercial world which has made its imprint upon history, and which will never be forgotten. With the advent of these two discoveries came the need for remodelling and proportioning of this apparatus to meet the special requirements. Makers all over the world began to construct instruments to meet the exacting demands of each particular case. Technical faults, which in the past did not greatly interfere with requirements, had now to be either minimised or remedied. So sudden was the announcement of Rontgen's discovery that for a considerable time those who were desirous of following up his researches had to content themselves with coils already on the market. It was not an infrequent occurrence to find workers preferring to risk the climatic uncertainties of the frictional machine to the indifferent induction coil. The time had arrived when greater attention had to be paid to insulation, a re-adjustment of core, primary and secondary windings in order to produce an instrument capable of the best results. Then, again, existing breaks were not suitable to the new demands and for the greater current output required, and the users had to be secured against possible breakdown. These improvements all required time and experiment. Coil makers were not slow to grasp the situation. In the year 1896 I purchased from the laboratory of the late Sir Chas. Bright an 18in. coil which had broken down and only gave a 2in. spark. With this, in April, 1896, I took my first X-ray of a nail in the foot, using a 3½in. focus tube, the exposure taking eight minutes. With a modern coil this would be accomplished in a second.

Having reviewed the early history of the induction coil, I will now refer briefly to the construction and operation of the modern apparatus. For many years makers sold their coils on the spark length system, and they were placed on the market as giving 1in., 2in., or 3in. sparks, and many coils made for medical work were made to give shocks without any direct care being given to the relations between core, primary and secondary windings, etc. In support of this statement the following is an extract from a treatise on Electro-Magnetic Electricity. Speaking of Rhumkorff's coils of 1851, and of others built by Hearden, of Plymouth, and by Bentley, it states: "But to Mr. Ladd's is due the merit of constructing a serviceable apparatus which would always produce the most reliable results. A very large coil having a secondary of seven miles of wire has long been used at the Polytechnic. It consists of the usual primary coil wound round a faggot of iron wires, around this is the secondary coil of the required number of miles in length. The condenser composed of sheets of tinfoil is placed in the base of the coil box and by using a convenient contact breaker, an enormous current is induced in the secondary which produces the most brilliant results." All this, however, is now a matter of history. The modern coil maker will supply you with an apparatus capable of the heaviest duty, and give you a guarantee of one or even two years against breakdown from ordinary usage. Since the advent of the large pattern X-ray tube and the demand for rapid radiography, also for coils giving larger output for wireless work, makers have designed their apparatus on quite different lines than hitherto. Instead of the bundle of annealed wire for their cores, they have adopted thin sheets of transformer iron. Each sheet or layer is carefully varnished, and they are built in steps to economise space as much as possible. The core is well insulated, and on it is superimposed the primary winding. This also has come in for special consideration. At one time it was common practice to use what was termed a straight winding, that is, two, three, or four layers with the two ends of such a coil brought to the terminals. Now, nearly all large coils are built with what is known as a sub-divided primary where (tappings are taken from each layer and brought to the necessary number of terminals. These may be coupled in series, parallel or parallel series, according to the class of break in use, so as to secure the best results. The insulating tube covering the primary to receive the secondary winding is greatly improved, the ebonite article giving place in the best makes to special mica tubes, and the walls of such are much thicker than formerly. Perhaps more attention has been devoted to the secondary winding than any other part. For heavy duty the old 2 and 4 section secondaries have dropped out, and almost without exception makers adopt the system of winding in pies or flat sections. A 12in. coil

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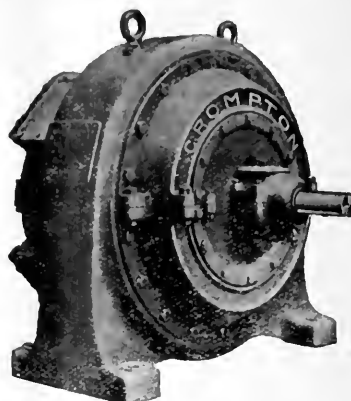
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may have from 40 to 250 such pies, and each section is carefully insulated from its neighbour by either mica or ebonite discs. The finished winding is then filled up to a required diameter with insulating material, and the whole secondary coil is then exhausted in a large vacuum receiver.

High-class apparatus of this type is no longer sold as giving such and such a spark length. Makers usually state that their coils will register a certain number of milliamperes across an 8in. air gap, or that they are capable of passing so many milliamperes through an X-ray tube of ordinary penetration properties. Here is the guarantee of one reputable firm. Speaking of the mercury jet, they say: "With this break and a primary current of 10 amperes at, say, 200 volts using one of our heavy discharge coils, an almost unidirectional discharge of some 60 millimeters can be crossed an 8in. spark gap. They add: This is the result of actual tests, and all our 12in. heavy discharge coils are guaranteed to give this output." I think you will gather from the foregoing that the construction of the modern coil has undergone a considerable amount of remodelling, and is an instrument to be proud of. The next essential to a well designed induction coil is a suitable form of break. The hammer pattern is unsuited to coils built for heavy discharges, and is now almost entirely relegated to small coils. The mercury dipping and jet or turbine break is in common use, and for all but very heavy work is quite reliable and satisfactory. It is greatly improved by using coal gas as a dielectric, instead of alcohol, methylated spirits or oil. These latter caused a great deal of sludging of the mercury, and the cleaning process was annoying, to say nothing of the delay. Where coal gas is unobtainable the best substitute is acetone. Many workers use only the electrolytic break, either the Wehnelt pattern or the Swinton or Simon type. The former is only suitable for direct current and voltages ranging from 40 to 80. The latter, however, is suitable for either the A.C. or D.C. supply, but requires from 150 to 250 volts to be satisfactory. I have a few examples of induction coils and breaks here to-night, which I shall be pleased to show you later. In conclusion, I may say that had I more time at my disposal I should have described some coils built for special purposes. I may have this opportunity at a later date. I think, gentlemen, when you consider how much we owe to the humble induction coil, whether you find it in the smallest form, serving through your telephone, supplying the spark to ignite the gases in your motor cars, engines, launches, torpedo boats, flying machines, farm tractors, etc., sending messages through space without wires, or serving in the medical or surgical world such a useful purpose, when you ponder over these things you will agree with me that I need make no apology for selecting this topic to address you on this evening. I thank you for your patient hearing.

New Patents.

30. Joseph Petersen and Olive Nea Gillingham.—An improved vegetable soap.
31. Richard Skinner.—A new or improved tool or device for the use of miners and others who engage in blasting and like operations.
32. Charles William Rea Campbell and Frank Gwynne Alfred Roberts.—Improvements in the production of picture effects.
33. Alexander Purser and George Daniel Hook.—An improved valve for compressed air and the like.
34. John Graeme Balsillie.—Process for obtaining water from aqueous particles in elevated regions of the atmosphere.

Randfontein Central.

The following circular has been addressed to shareholders of the above company: Dear Sir or Madam.—Shareholders are aware that a change of control of the company's affairs took place in January last, and your Board has been fully occupied in the consideration of matters relating to the company's interests. A preliminary report on the position of the mine has been received from the Consulting Engineer, from which the following extracts have been made: Too much gold has in the past been taken out of the plants, and the work has, consequently, been uneconomical. In order to effect full economy in this direction, and place the reduction works in a sound position, a considerable stock of gold will have to be accumulated in the plants. It has been the practice on this mine to commence the monthly clean-up of the reduction works on the first day of the subsequent month, and it is advisable to bring the date back some days so as to complete the clean-up by the end of the month, and thus bring it into line with the practice obtaining on the other mines of the Barnato Group. The underground workings have suffered through a minimum amount of development having been done, and more particularly through a constant effort to obtain the maximum gold without due regard for the future. The amount spent annually on shafts has been exceedingly heavy, but even so the shafts are expensive to maintain and poorly equipped. This drawback will have to be remedied. It will also be advisable to put in hand as early as possible a central pumping scheme, as there are large quantities of water to be dealt with, and so far there has been no effort to organise this work. After a careful examination of the system of accounting hitherto obtaining, important alterations are recommended, as in the past considerable items have been allocated to other accounts which should, strictly speaking, be charged to working costs. Although these alterations will materially affect working costs, they are essential. These recommendations are in the best permanent interests of the company, and have been adopted by the Board. As a consequence there will be a reduction in monthly profits to about £50,000 for some months. Your Board has no hesitation in stating that you possess a very valuable property, but it will be necessary for shareholders to exercise a measure of patience before it can be hoped to derive profits commensurate with the value of the vast ore deposits.

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Company Meetings.

GLENCOE COLLIERIES, LTD.

The 15th annual general meeting of shareholders of the Glencoe (Natal) Collieries, Limited, was held on March 14 in the boardroom, Stock Exchange Buildings, Mr. A. Mackie Niven (chairman) presiding.

The Chairman, in moving the adoption of the report and accounts, drew attention to the improved financial position. The company, he said, had had a very good year's trade, and had earned good profits. They had been able to secure a further advance in the price of bunker coal, which shipowners could very well afford to pay, and despite the difficulties caused by the war he anticipated a very substantial increase in profits for this year. Referring to the coal trade generally in Natal, the Chairman pointed out that the feature of comparisons for the last three years was the large reduction in coal exported by sea, the export in 1916 being less than 200,000 tons, as compared with 615,550 tons in 1913, the last complete year under ordinary conditions. The cause was not far to seek.

Vessels which under normal conditions would take cargoes of coal to India and the East had been able to earn much higher freights on other routes than coal was able to bear. Another interesting com-

parison was that of coal bunkered, which had nearly doubled, the tonnage being 1,519,182 as compared with 831,074 a year ago. During the period Natal lost a great deal of bunker trade formerly done with vessels which came to our port owing to the closing of the Panama Canal. The canal was reopened during the year, but the loss was far more than made up by the fleets of steamers using the Cape route carrying foodstuffs and men to Europe, and others carrying supplies and men to the Eastern theatre of war. The importance of this trade to the Port was further emphasised by the number of vessels calling for coal only, namely, 730, as compared with less than half that number during the previous twelve months. It was satisfactory to be able to record considerable improvement in regard to the supply of trucks during the period under review.

Recently there had been considerable truck shortage which had lasted for some time. It is generally believed that the cause of the shortage now is not the want of trucks so much as the scarcity of locomotives. These are of necessity being used long after they should be in

the workshop for overhaul and repairing, and, as a consequence, very many of them are getting into bad order—very few new engines are available. It is difficult to see where relief is to be got unless it be in the direction mentioned by Major Bagot, in writing to the newspapers the other day, when he suggested that long distance railway passenger traffic and excursion traffic might be cut down to a minimum. If this could be done by raising the fares or otherwise some relief would be given to the locomotive department. The experience of the year should convey to the Government the much-needed lesson. The Natal and Transvaal Coal Owners have, in season and out of season, and for years before the war began, made the strongest representations as to the need and advisability of laying in ample supplies of trucks and locomotives, more were ordered, but not nearly sufficient.

The report and accounts were adopted. The meeting confirmed the appointment of Mr. E. Mansfield as a director in place of Mr. E. C. Jamieson, resigned. Mr. Mansfield and Mr. B. W. Brayshaw were re-elected as directors.

Messrs. Herbert Robins and Henry Jamieson were reappointed auditors.

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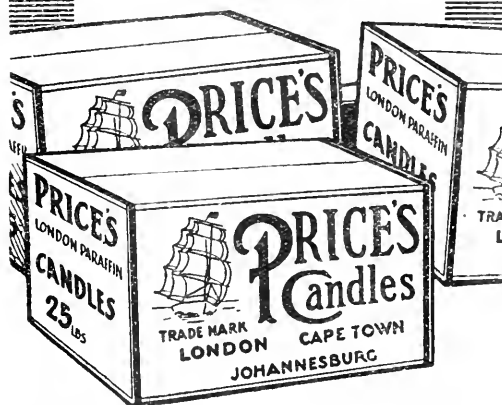
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NOTICE TO SHAREHOLDERS.

NOTICE IS HEREBY GIVEN that the Twenty-second Ordinary General Meeting of Shareholders for the year ended 31st December, 1916, will be held in the Board Room, The Corner House, Johannesburg, on Thursday, 21st June, 1917, at 11.30 a.m., for the following business:

- 1 To receive and consider the Balance Sheet and Accounts for the year ended 31st December, 1916, and the Reports of the Directors and Auditors
- 2 To confirm the appointment of Mr. M. Honet as a Director of the Company in place of Mr. A. P. Richter, resigned, and to elect Directors in the place of those retiring in accordance with the provisions of the Company's Articles of Association
- 3 To determine the remuneration of the Auditors for the past audit, and to appoint Auditors for the ensuing year
- 4 To transact any other business which may be transacted at an Ordinary General Meeting, or which is brought under consideration by the Report of the Directors.

The Share Transfer Books of the Company will be closed from 21st to 28th June, 1917, both days inclusive.

Holders of Share Warrants who desire to be present or represented at the Meeting must deposit their Share Warrants at the places and within the times following:—

- (a) At the Head Office of the Company in Johannesburg, at least three days before the time appointed for the holding of the Meeting.
- (b) At the London Office of the Company, No. 1, London Wall Buildings, London, E.C., at least 30 days before the date appointed for the holding of the Meeting.
- (c) At the Office of the Credit Mobilier Français, 30 and 32, Rue Taitbout, Paris, at least 30 days before the date appointed for the holding of the Meeting.

Only Share Warrants bearing French stamps can be deposited at the Credit Mobilier Français.

And shall otherwise comply with the "Conditions as to the issue of Share Warrants" now in force.

Upon such deposit a Certificate, with Proxy Form, will be issued under which such Share Warrant holders may attend the Meeting either in person or by proxy.

By Order of the Board,

W. E. S. LEWIS,
Secretary

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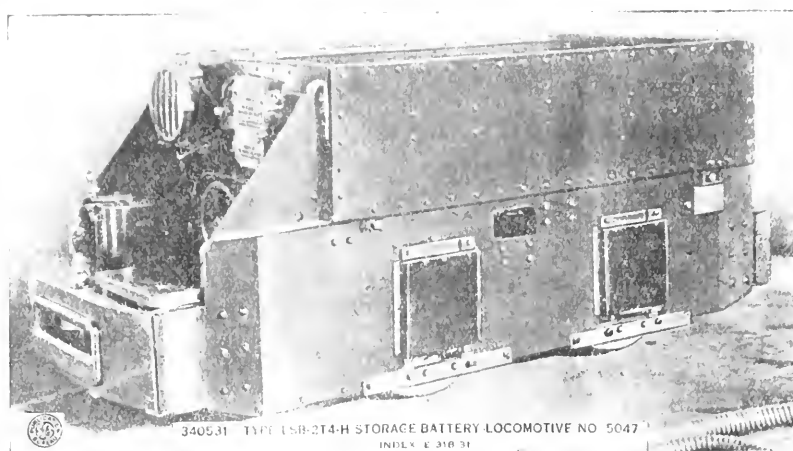
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